

# The Mining Journal,

## RAILWAY AND COMMERCIAL GAZETTE:

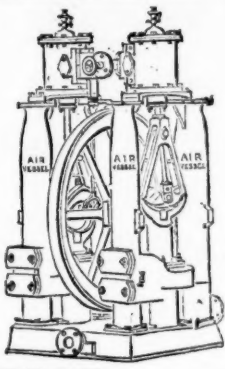
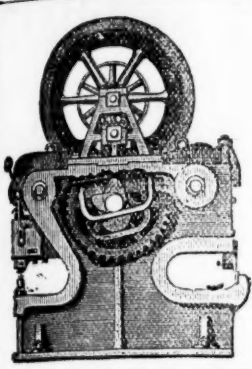
FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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No. 2039.—VOL. XLIV.

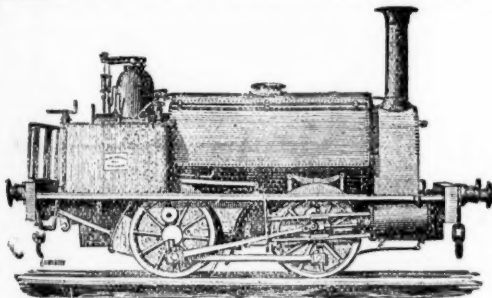
LONDON, SATURDAY, SEPTEMBER 19, 1874.

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L'Administrateur Délégué.

(Signed)

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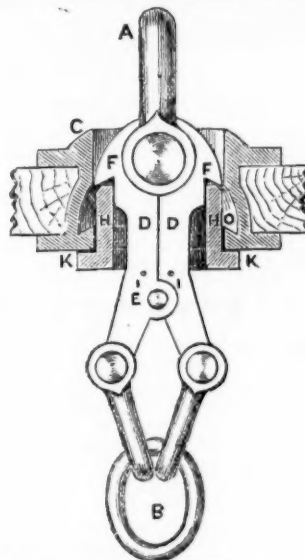
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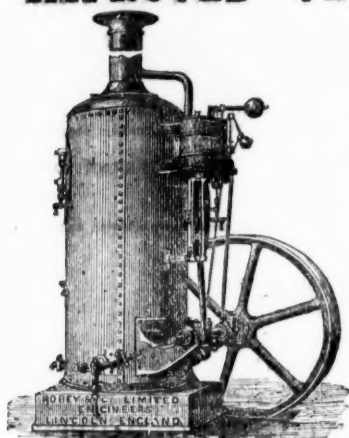
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Patent No. 4136 - - - - - Dated 16th December, 1873.  
Patent No. 4150 - - - - - Dated 17th December, 1873.

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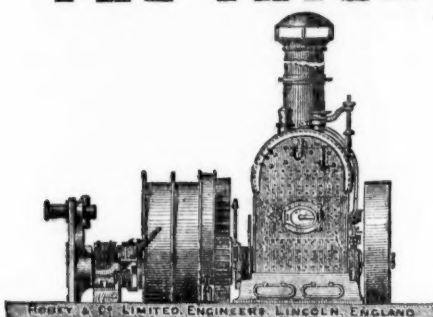
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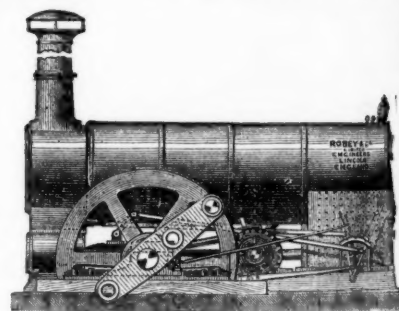
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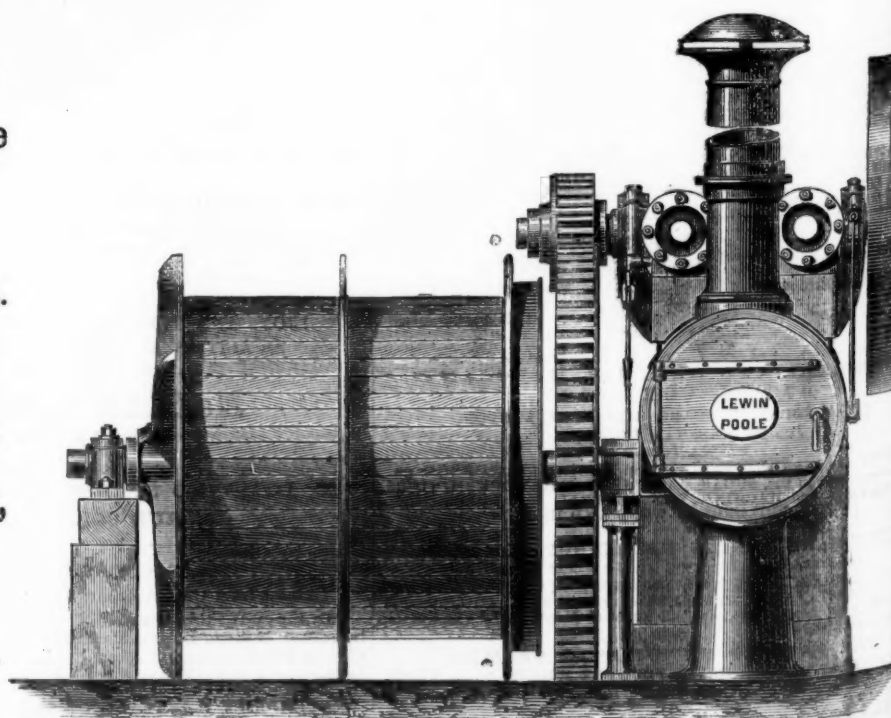
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## Original Correspondence.

## MINING IN QUEENSLAND.

Sir.—The quantity of stream tin received at the Warwick Railway Station for the past three months has been as follows:—

	Tons c.	qr.	lbs.	Tons c.	qr.	lbs.
April	450	5	3	14		
May	490	13	0	12		
June	534	12	0	11 = 1455	11	0

Showing a steady increase on the previous quarter, month by month, but showing a considerable falling off when compared with the same months of 1873. One-third of this our Colonial Treasurer, in his Budget speech, stated comes over the border from the New South Wales mines. No smelted tin has as yet been received at the railway station, but I am informed that one furnace has been finished on the Kettle Swamp Company's ground for some time, while a second, belonging to another company, is nearly finished, and arrangements are nearly completed to introduce the Dutch (charcoal) furnace on the field, there being any quantity of hard wood there fit for that purpose. I am able to report that the quality of the stream tin now being forwarded is very much improved, the receipts for the past quarter may, I am sure, be estimated as fully 63 per cent. The tin lodes still remain unworked, but I hear of operations on an extensive scale about being commenced at the Red Rock by an English Company, and I have no doubt, if efficiently managed, that it will pay the adventurers handsomely. There are dozens (I might say hundreds) of lodes showing rich prospects, and that here and there have been opened up for a few feet and abandoned; in fact, the tin field is a network of splendid lodes, the development of which is not thought of yet. The news of the rise in the tin standard was most welcome, but, so far as I am aware, it has not as yet had the slightest effect on the production, the fall in December to February was so sudden, unexpected, and so serious, that the late rise is looked upon with suspicion, and considered likely to be only of a temporary character. The steady increase in production during the last quarter I attribute to the particularly favourable weather the miners have had during that time—cool fine weather, with plenty of water in the creeks and gullies for sluicing purposes, without floods to retard the work and damage the races, and I expect if the present price keeps firm (100s.) that the production will keep up, but there is still a heavy prejudice against tin washing to remove. The exports of tin for the six months ending June 30 from the port of Brisbane have been as follows:—

Stream Tin.	Weight.	Value.	Aver. per cwt.
United Kingdom	Cwts 10,408	£34,252	65s. 10d.
New South Wales	35,190	106,662	60s. 7d.
Total ore	45,598	140,914	62s. 0d.
Tin in ingots.			
United Kingdom	Cwts 10,012	£43,912	87s. 8d.
New South Wales	328	1,320	89s. 6d.
Total in ingots.	10,340	45,232	87s. 6d.

If we average the stream tin at 63 per cent. we have 1950 tons ingots, of the average value of 95s. per ton, exported during the half-year; to this may be added about one-fourth, as the quantity sent overland from the New South Wales field to Grafton and Murrumbidgee (the quantity sent overland being considerably less than during the previous half-year, owing to the impassable state of the roads during and since the wet season), and we arrive at a pretty fair estimate of the total quantity of ingot tin shipped from Australia to London during the half-year—2500 tons. As will be seen by the above figures, over three-fourths of the stream tin exported from Brisbane is shipped to New South Wales (Sydney), and that nearly the whole of the ingot tin is shipped direct to London. The difference in the declared value per hundredweight between the stream tin shipped to the United Kingdom and to Sydney is to be accounted for by the fact that the London tin is all drawn against, and consequently fully valued, while the stream tin shipped to Sydney, New South Wales, is not, the quality in both instances is alike.

The whole of the ingot tin shipped from the port of Brisbane up to this date is the smelting of the Queensland Smelting Company (Limited). During the past half-year they have turned out 1100 tons of ingots, equal to 50 tons per week, being kept fully employed during that time. They have been adding extensively to their plant, having just finished two additional melting furnaces, and a second refining furnace nearly up. From this time forward they will refine all their metal to a uniform standard of 99.50, and they contemplate turning out at least 70 tons of ingots up to this standard per week. It is further the intention of the company, I am informed, to commence the building of two more furnaces at once. Lastly, they have this week advertised a reduction in their prices for smelting to 6s. per ton. They have the ball at their foot, and they evidently mean to keep it, and they certainly are deserving of the success which attends them. I have, month after month, written for the exports and imports of tin at Sydney for 1873, but the answer to my last has been "not yet made up."—Brisbane, July 13. RESIDENT.

## MINING IN NEW SOUTH WALES.

Sir.—Permit me to correct a statement made in a letter which appeared in the Journal of April 11, over the signature of "R. Adams," and dated Sydney, Feb. 8. The writer, referring to New South Wales tin mining, says—"Tin is being worked principally by private parties who engage tributaries, and it is difficult to find out what is being done, but as last year's return was about 10,000 tons, and January shows no falling off, it is fair to assume," &c. Last year's yield of the Queensland and New South Wales tin fields combined did not reach one-half of the quantity Mr. Adams states, certainly not more than 4100 tons of tin, while New South Wales did not contribute more than one-half of that quantity, if so much. Again, there was a very considerable falling off in the month of January; as much as 75 per cent. on the previous November, and 50 per cent. less than the previous month (December).

Your correspondent "C. E." in the next column of the same issue of the Journal, I was glad to see, contradicted this statement of Mr. Adams by the figures he quoted, and which even included the month of January. I think it only fair to draw your readers' attention to the matter again, as this is the fifth or sixth time I have seen such statements thrust forward in the public press, all emanating from Sydney. "C. E." in his letter dated Sydney, Feb. 10, quotes figures giving the yield of stream tin for the last half of 1873, as follows:—

Received at	Tons c.	qr.	lbs.	Tons c.	qr.	lbs.
Warwick Railway	2684	17	1	38		
Murrumbidgee Railway	807	19	2	9		
Grafton Port	859	0	0	0 = 4241	17	0

If any of your readers will take the trouble to tot up the quantity I have given in my reports month by month for the period he refers to, they will find a considerable discrepancy between the quantity given by "C. E." as shipped at the Warwick Railway terminus and mine; and I must, in justice to myself, claim my figures as correct. The returns I have heretofore sent you in my report have been kindly made up by the railway department especially for me, and are taken from the railway goods invoices. "C. E.'s" shipments via Murrumbidgee and Grafton may at the same time be correct, and if so the statement that I made in my report of Jan. 21, and inserted in the Mining Journal of March 28—"that about 4000 tons of tin was the total yield of Australia for 1873" was within 100 tons of being correct—it was a matter of very great satisfaction to me to see my report so fully confirmed, as until "C. E.'s" letter appeared in print my statements stood alone.

In the last paragraph of "C. E.'s" letter he refers to the permanency of the tin fields. My opinion is (and I must ask your readers to take it as only the private opinion of a person with but little tin mining experience) that from this time forward year by year the yield of tin must gradually increase. My reason is that tin is to be found in stream and lode over such an enormous extent of country in this colony and New South Wales. The ground already worked does not comprise one thousandth part of the ground known to contain stream tin, while the tin lodes are not even touched.

To give you an idea of the extent of country, I send you the Government lithographic plans of the Queensland tin field. That of New

South Wales covers much more ground, though more patchy. The supply depends entirely on the price. If the standard rises to 120s. again, the tin field will have a different appearance to what it has now within three months.—Brisbane, July 1. RESIDENT.

## MINING IN NEW BRUNSWICK.

Sir.—Feeling confident that information in reference to the mining prospects of this country at this season will not be out of place to the British public, I have ventured to prepare a few facts for insertion in your valuable Journal, which has ever been open for the weal of its readers. Notwithstanding the unsuccessfulness of mining, which has only been carried out to a very limited extent in this province, its mineral resources still remain undeveloped. In no one instance do I know of a lode having had a fair trial so as to prove its value. The attempts generally have been made by parties who are totally unacquainted with mining, and the selections made have been when a stone of ore (cursory) has shown itself, regardless of the essential characters of the lodes, or their surrounding formations, for the production of minerals.

Characters in this respect have been clearly shown by all practical men and writers, both in Europe and America, as the greatest guide in searching for minerals. And I venture to assert that there can be found in New Brunswick, both in the Silurian and Devonian formations, Champion lodes, possessing all those essential characters, yielding fine specimens of copper glance, malachite, grey copper, and carbonates, in lodes varying from 6 to 15 ft. in thickness, bordering on the sea coast, with lumber in abundance for mining purposes, and transit being easy makes them most desirable properties for investors, with every chance of great remuneration. Those lodes traversing amygdaloidal traps, green stones, trachytes, chloritic and ferruginous slates (metamorphic), and crossed by highly mineralised elvan courses, have a most flattering appearance for an abundance of mineral wealth, but remain intact; whilst others, on which the practical eye looks with grave suspicion, have been highly praised, and on which most absurd reports have been written. Again, true titles to those lands are rarely obtained, especially the islands, and a great hue and cry is raised over a vision, and at the same time an injunction is pending, and you find after a great outlay that you have only purchased a lawsuit, with no right to go below high-water mark, as some other owns the outside. I would strongly advise capitalists to receive all Atlantic brethren's offers with great caution, no matter whether introduced by an Englishman, some of whom are used as tools, or otherwise. "Bears" and "Bulls" are also used when needed, and freely, too, to the prejudice of legitimate mining. To mining capitalists desirous of embarking in first-class investments New Brunswick offers every inducement to obtain great remunerations, but I would say "have a care." New Brunswick, Aug. 31. AN ENGLISHMAN.

## REDUCTION OF GOLD-BEARING ORES IN CALIFORNIA.

## IMPERFECT CONCENTRATION AND AMALGAMATION.

Sir.—There is, perhaps, no subject of more importance to the mining interests of California than the treatment of gold-bearing ores. It is a fact worthy of consideration that after twenty years' experience at this business fully one-third of the assay value of all the ores now being worked, amounting to several millions annually, passes off in the slums, and is lost. During this time immense sums of money have been expended in various ways trying to perfect some process by which these ores could be worked up to a higher percentage. Speaking by the light of ten years' experience in quartz mining and milling, I am of the opinion that the principal cause of this great loss is to be found in our imperfect methods of concentration or amalgamation. In considering this subject, I will speak only of the natural laws involved in these operations, and the results of my own experiments.

CONCENTRATION.—I commenced this business believing, as many other theorists have done, that all gold ores could be concentrated on coming from the battery by machinery without handling, and that gold sulphurets could be treated successfully only by the chlorine process. I continued in this belief for many years, spending time and money, and accomplishing nothing. Some eight months since, in connection with moneyed men of San Francisco, I purchased a mine which had the reputation of producing ore of a very refractory character. This ore assayed \$30 per ton, but not more than one-fourth of it was sufficiently free to admit of its being amalgamated in the battery. I erected a five-stamp mill, and tried various methods for concentrating the sulphurets. The best result obtained was 25 per cent., which, together with the free gold, formed only 50 per cent. of the assay value of the ore. At this juncture I abandoned everything with the word patent on it, and going back to the first principles constructed an old-fashioned Cornish buddle, and sized the ore in two sizes, using two pointed boxes, after the plan adopted by the most improved mills in Grass Valley; all the materials held in suspension by the water were allowed to pass over the second box and go to waste. I found by concentrating the two sizes separately in the buddle that I could get about 8 per cent. more than when they were concentrated together. In this way 10 per cent. more was saved than by any other plan yet tried.

The tailings as they came from the buddle were assayed, and found to contain 10 per cent., leaving 30 per cent. unaccounted for. A tank was then constructed 12 by 12 with a partition in the centre, and the slum that ran over the second box was allowed to pass into the one and out of the other, giving it plenty of time to settle. In this way one-fifth of all the ore crushed was settled in the tanks, the contents of which assayed 23 per cent., being at the rate of about \$6 per ton of ore, making a saving of an assay of \$48 per day with an 8-ton mill. Deduct this 10 per cent. for loss in concentrating, 25 per cent. for working, and \$1 per day for cost of concentrating, resulted in a net profit of \$80 per day, \$900 per month to the mill. A barrel holding 60 gallons was placed under the stream of water from the tank, and when full was left 24 hours to settle, a little alum having been added. The top was then carefully poured off, when the sediment was found to contain about 1 per cent. of the ore, which was held in suspension by the water after it had become comparatively clear: 8 per cent. could not be accounted for. It could easily have been wasted in the battery, or more than an average might have been got in sampling the mine. This latter was hardly possible, however, as great care was taken to ensure a fair sampling by drilling through the ledge in various places. This result did not surprise me in the least, having long been aware that a large percentage from most mills had been lost in this way. The question was how to concentrate these tailings up to a higher grade, they not being rich enough to pay for chlorinising. Various methods for accomplishing this were tried. The best result from the round buddle, using an ordinary broom for sweeping, was 50 per cent. A buddle was then constructed on a larger scale, and with much less grade than the one already in use. A piece of common mill blanket was put on the arm for sweeping, and a small stream of water turned on; this proved a success, as shown by assay, 12 tons having been reduced to 1 ton at a cost of 75 cents per ton. There was still a loss of 10 per cent. Various tests were made in order to determine what grade of sulphuret ore would pay to concentrate. Some 20 tons of coarse tailings had accumulated from the buddle, which after testing proved to be worth \$2.25 per ton. This was reduced at a cost of \$7.50 to 500 lbs., which had an assay value of \$30. Deducting from this 25 per cent. for loss in working, and \$7.50 for labour of concentrating, left a net profit of \$14. I now became satisfied that no machine yet invented can concentrate the majority of ores to more than 50 per cent. of their assay value without their having first been sized and settled in tanks. Assuming that ore requires settling before it can be concentrated up to a high percentage, it is only a waste of time and money to attempt its concentration before settling, as the cost is the same whether it be high or low grade. As a consequence any machine that fails to take out more than half the value of the ore is of no practical use. All ores must be sized in three different sizes before they can be properly concentrated. Lead sulphurets are 9½ times heavier than water, and 5 times heavier than quartz. Common iron or copper sulphurets are 7 times heavier than water, and 3 times heavier than quartz. The coarse pulp and sulphurets capable of passing through an ordinary No. 6 mill screen are,

perhaps, on an average 50 times coarser than those found in the slum ores. They should, therefore, be concentrated separately, otherwise a current of water sufficient to carry off the coarse pulp will also carry off the sulphurets, notwithstanding the latter are from 3 to 5 times heavier than the pulp, which, being composed of quartz about 50 times more bulky than the sulphurets, exposes a corresponding surface to the action of the water.

To obviate this trouble we must equalise the tailings, bringing the sulphurets and the pulp to the same size, then equalise the water to correspond with the fineness of the pulp, and a current that will carry off the latter will leave the heavier sulphurets behind. No man experienced in milling will ever spend a dollar trying to concentrate ores in violation of these rules, or natural laws. Any of the quick-motioned concentrators now in use will separate a large percentage of the coarse sulphurets from the coarse sand, but at the same time they will hold the fine sulphurets, which are of the most value in suspension so long as the water continues in motion. The round convex buddle is the best equaliser in use, it being fed around the centre post, which is about 12 in. in diameter. As the water recedes from the centre it spreads, and consequently decreases in force. If the current of water be strong enough to start the finest sulphurets from the head of the buddle it will become so diminished before reaching half the distance from the centre to the circumference that the sulphurets are left behind. The concave or centre discharging buddle is fed on the outer rim and discharged in the centre; consequently the water increases in force towards the centre, hence fine sulphurets leaving the circumference of the buddle will be carried towards the centre with the pulp by the increasing force of water. In the tin, lead, and copper mines of England, where concentration has been carried to a higher state of perfection than anywhere else, they have long since discarded the centre-discharging buddle, and use only the convex. Many mining superintendents contend that their ores are not rich enough to justify handling and concentrating in round buddles, but I am of opinion that all ores below permanent water level will pay to concentrate if they will pay to work at all. Silica is no more the mother of gold than iron or sulphur. Gold cannot, therefore, exist in its natural state without being accompanied by these metals, any more than without quartz; and just in proportion to the presence of these substances is this metal free or otherwise. Air concentration is governed by the same natural laws that govern the wet process, this element being used as an equaliser instead of water. Antimonial copper glance, and some other classes of ore, have been concentrated very successfully by the air process. Any ore that admits of the metal being separated from the quartz by granulation without pulverising can be concentrated dry, and hence by this method. In most gold ores the metal is so diffused throughout the ore that the latter requires to be finely pulverised before the metal can be separated from the quartz. It has yet to be practically proved that any air concentrator will successfully concentrate the great mass of gold ores. After the concentration was perfected 200 tons of ore were run through the mill, and further concentrated to 15 tons, which were shown by assay to contain 91 per cent. of the gold found in the ore after being settled in the tanks, and before it was concentrated. This second concentration cost 63½ cents per ton.

AMALGAMATION.—The business of concentrating gold-bearing ores, though not without its difficulties, is yet simple and inexpensive compared with that of their amalgamation. The former is mechanical, the material requiring to be handled according to its specific gravity. Any machinery or method of handling that will answer for one ore will do also for another, provided the weight, bulk for bulk, be the same; and where this is not the case all that is necessary is to so equalise the air or water as to correspond with the weight of the pulp. In the amalgamation of ores, however, we have to deal with chemical as well as mechanical laws and agents, rendering the business much more costly and complicated. The treatment that will answer here for one class of ore fails when applied to another, owing to the presence of different minerals, or to the same minerals being present in different proportions, causing chemical combinations in endless variety. Although the desulphurising and amalgamation of gold sulphurets has for many years been extensively experimented upon in California, no plan has been brought into general use whereby refractory ores can be satisfactorily treated, or low-grade sulphurets worked with profit, the only tolerably successful method for reducing sulphurets being by the chlorine process, one that is attended with too much expense to answer for low-grade material. Some amalgamators contend that gold being found in a metallic state only requires grinding to a certain degree of fineness to admit of amalgamation. This rule, however, will not hold good with a majority of ores, if, indeed, it will with any. However fine the gold may be it is more or less coated with sulphur, iron, or other base metals, from which friction fails to free it. There is no limit to the divisibility of gold. A certain percentage of gold in all sulphurets must be submitted to the action of either fire or chemicals before it can be freed from these coatings. Either will answer, the question being which is the most economical. Nitric acid desulphurises very effectually, but it is too expensive for general use, though on high-grade ores, which are difficult to treat, it can sometimes be employed to advantage.

In the course of my experiments the plan was tried of grinding from four to twelve hours in a Hebburn roller pan, and amalgamating in a wooden-bottomed settler, the best result obtained from clean sulphuret being 40 per cent. This ore under the same treatment yielded from 50 to 60 per cent. without concentrating, the quartz assisting in freeing and brightening the gold during the process of grinding. This ore was also experimented with in a Varney pan, grinding from 12 to 24 hours, with but little better results. A reverberatory furnace on a small scale was then constructed with a view to desulphurising and amalgamating in pans. No difficulty was found in desulphurising, but with a reverberatory furnace it was found impossible to oxidise the iron and copper. All gold ores carry more or less iron, while many contain sulphurets of lead and copper, all of which must be thoroughly oxidised before the gold and silver can be amalgamated in pans. If the iron and copper are not oxidised before being ground in the pans they will pulverise into a fine powder resembling emery, which, on coming in contact with the quicksilver, changes it from positive to negative, in which condition it has no affinity for gold. Any portion of the quicksilver that fails to flower and rise to the surface of the water will become coated over with a black scum from the iron and copper, and no satisfactory results can be obtained. Thoroughly oxidise the ore, however, and the iron and copper will dissolve, and be held in suspension in the water, leaving the gold free to be taken up by the quicksilver. Any failure in getting a good result in amalgamation when the ore is in this condition is owing to mechanical causes, and not to the chemical condition of the ore. The gold in some ores being very fine it is difficult to bring all the particles in contact with the quicksilver, even if it be free. The best result obtained from ores imperfectly oxidised was from 50 to 60 per cent. of the assay value, which could only be obtained by using salt in grinding. This method possesses no economy over the chlorine process, notwithstanding the ore, after being roasted and amalgamated, can be re-concentrated in the slum buddle, and all that remains in it can be brought up to a higher grade than before roasting. Ores, I found, concentrated much better after roasting than before, everything in them losing specific gravity but gold and silver. The difficulty of oxidising ore in a reverberatory oven consists in not being able to furnish it with a plentiful supply of oxygen. In order to do this the ore must come in contact with air. The oxygen contained in the air taken in through the furnace is destroyed by heat before it reaches the ore. Again, the air cannot get at the ore so long as it lays in bulk on the floor of the oven, no matter how much it is stirred. It must be varied, and allowed to fall through the air after it has attained a proper degree of heat, the air being supplied in some other way than through the grate.

A furnace constructed on the principle of the Stötefeldt, which would continue raising and lowering the ore through the air after it had reached a proper degree of heat, would thoroughly oxidise and desulphurise any gold it might contain in from one to three hours. An instance establishing this fact might be given: 25 lbs. of ore was placed on a small sheet-iron furnace constructed for the purpose, and when at a red heat was raised, and allowed to fall through



the air for three hours, after which it was ground and amalgamated in a small Varney pan. By this treatment it was made to yield from 70 to 80 per cent. of the gold it contained. In roasting ore for the chlorine process salt is used, which assists in oxidising: this substance cannot, however, be used in roasting for amalgamation, as on coming in contact with the fire and sulphur sulphuric acid is formed, which chlorinises more or less of the gold, preventing its amalgamation. When in this condition the only way to treat it is by the chlorine process, or leaching through barrels as lye is leached from ashes. Five tons of a lead sulphuret ore from a different mine were tested by the same process, this ore assaying \$26 in gold and \$10 in silver. It also contained one-fourth of 1 per cent. of lead in the form of a sulphuret, with a small per cent. of iron, but no copper. Fully 33 per cent. of the assay value was taken up in suspension by the water, and was settled in the slum tanks; only 30 per cent. of the gold was found sufficiently free to amalgamate on copper plates. No difficulty was found in concentrating this ore up to a high percentage, after which it was subjected to the same treatment as the lot above mentioned. The best result obtained before roasting was 30 per cent., after roasting from 75 to 80 per cent. was extracted in every instance, proving that lead was oxidised more easily than iron and copper. While no branch of the business holds out greater inducements to capital than quartz mining in California, scarcely any has been so generally neglected—a fact due in good part to the many failures that have heretofore attended this business. Among the causes that have led to these failures there is one that has been so generally overlooked that I propose here saying a few words about it, what I have to say being suggested by my own experience. As is well known, it has been the practice of parties about to engage in quartz mining in this State to take samples of ore from the mine in which they propose to operate, and have the same worked by what they were led to believe was a mill process—that is, by the same process that would be employed when they come to work the ore on a large scale. The most of these tests were made by some one of the metallurgical establishments in this city, all of which claim to have proper facilities for making the same.

The custom at these places has been to merely make an assay, or such a number of assays, of the ore left with them as might be necessary to determine approximately how much gold it contained, after which the bulk of the ore was pitched out of the back door. When a return in bullion was required, then the ore would be worked with nitric acid, or other expensive agents, all of which, because of their cost, it would be wholly impossible for the miner to use in a practical way, though the metallurgist, charging from \$40 to \$50 for his service, could well afford to employ them. Now it is not charged that these men were in the habit of giving a larger return of gold than the ore actually contained. But still a fraud was practiced upon their customers, inasmuch as they were left to infer that a similar result could be obtained operating upon large masses of ore by ordinary mill process. Acting upon this assumption mines were purchased and opened, mills erected, and other expenses incurred, only to end in disappointment, and very often involve the parties misled in financial ruin, the blame of the failure being generally cast upon the superintendent, or other innocent agents.

The mischief caused in this manner has been incalculable, and it is fully time that the attention of the mining public were called to it and the evil abated. Even if the proprietors of these establishments were disposed to act fairly, it is doubtful if any of them have facilities for properly working any considerable quantity of ore, and we all know that a fair mill test cannot be made on a single 100 lbs., or less. And yet they all claim to be able to do this, furnishing the miner with a written statement of the gold, free and combined, the sulphurets contained in the lot of ore manipulated. This all looks well on paper, and may sometimes serve a useful end in stimulating weak-kneed stockholders to pay assessments, but it will not do as a basis for mining and milling operations. Unless the Pacific Works now being erected at Oakland may prove such, there is hardly a place in the State to which the miner can take a ton of ore and have a fair and reliable mill test made of it.

**NECESSITY FOR A METALLURGICAL SCHOOL.**—In view of the foregoing state of things, and of the difficulties and losses that have attended all efforts at reducing our gold and silver-bearing ores, it would undoubtedly be good policy for the general Government to establish and maintain an institution for educating and training up practical workmen in this branch of metallurgy. Untold millions have been lost during the history of mining on this coast in consequence of our inefficient machinery and imperfect methods of treating these ores, and unless some measures are adopted for insuring their more skillful manipulation this waste must not only continue but go on increasing as the magnitude of our mining operations is extended. While it would be well for the Government to found one or more schools devoted to training up young men for the general business of mining, the demand for skilled metallurgists is so imperative that no time should be lost in providing the means for meeting its requirements. In selecting the site for an institution of this kind accessibility and convenience to the more important mining districts should be consulted, the vicinity of Virginia City offering, perhaps, the best site of any locality in the country. Connected with this school there should be a complete system of reduction works adapted to the treatment of every class of ore. Ample means should be provided for dry and wet crushing, furnaces for roasting and smelting, pans and other apparatus for amalgamation, together with every manner of agent and appliance requisite for assaying, as well as otherwise testing and experimenting upon the various kinds of ores. The instructors here employed should be men of scientific acquirements and practical skill, while the machinery and processes in use should be of the most approved kinds extant. At this establishment the mining public should be permitted to have worked small or large lots of ore, the quantity not to exceed a reasonable amount, and always by such process as in the judgment of those having charge of the institute might be deemed most suitable, this point to be determined of course by prior analysis of the ore. When completed, a statement would be furnished the miner setting forth the results of the working, the character of the ore and the machinery, methods and processes best adapted for its reduction, for all which service and advice the parties benefited would be required to pay an equitable compensation.

Samples of all the ore treated might be preserved and numbered, so that they could be readily found should there afterwards be occasion to refer to them, result of the working being recorded in a book kept for the purpose. This plan should certainly be adopted when the ores manipulated show a rare combination of minerals, or other peculiarity rendering them especially refractory. A cabinet for the collection of mineral specimens would also become a necessary appendage of the institution, the same being open for the use of the pupils as well as the public. Into this school would be received a limited number of young men—say, 25 or 30—as many as the work to be performed might require. They would obligate themselves to remain for a period of five years, placing themselves under the teacher, and working at least five hours every day, devoting also several hours to study. The course of training would embrace the study of mineralogy and chemistry, a thorough practical knowledge of assaying and metallurgy in all its branches, the crushing, roasting, and smelting of ore, including the proper management of mills and furnaces, together with the repairing of tools, &c. When well advanced in these branches the student might be taken into the mine, and taught the business of exploring for and extracting ores, including the erection and management of hoisting works, the placing of pumping gear and other machinery, the sinking of shafts, the driving of adits, &c. Every year a few additional pupils could be admitted to the institution. After paying a moderate admission fee the labour of the pupils would be an equivalent for their board and instruction. The sum of \$300,000 would suffice to erect all needed buildings, and outfit the establishment, after which admission fees and the income from treating ores in an experimental way would go far towards defraying current expenses. If the Government feel able to do anything more than it has already done towards aiding this great and important industry it would be much better to direct its exertions into some such channel as this than by waging war on this interest, and making itself ridiculous at the same time by its encouragement of the Suto Tunnel scheme. The expenses incurred

by Government on it would have been ample to build, equip, and set an institution of this kind in successful operation. MINER.

#### THE RICHMOND CONSOLIDATED MINING COMPANY.

SIR.—Mr. Probert told the shareholders of the Richmond Company last January that he had bought every adjoining claim that could give them trouble. This is not exactly correct: as the only lode that could give trouble, or, as I consider, was worth paying for, he refused to purchase, though I offered it both to him and Mr. Corrigan again and again for \$3000—my last tender at that figure being made to the latter in November, 1873. Once or twice when they had taken weeks and months to make up their minds I had concluded not to sell. It is clear now that the Selkirk claim is the continuation of the K. K., Buckeye, and Champion Mines, and that the Richmond is a deposit off at one side of the great main lode. To reach the Selkirk the Richmond Company ran a level, in limestone, 220 ft. south-westerly from the McGee shaft, 400 ft. from the surface. The ore struck there is of magnificent quality, being rich both in lead and silver. Unfortunately for the shareholders the discovery is not on their property, though I believe the company owns 80 ft. on the lode between the Champion and Selkirk, and that will, of course, be of considerable value. The Richmond Mine is not now what it was a year ago. Through the *Mining Journal*, and by efforts in other directions, I endeavoured several months back to prove that its value had been exaggerated, but capitalists would not take my warning, being under the impression seemingly that I was attempting to "bear" the stock. I certainly had no such design. If the company had owned the Selkirk and Cyrus lodes now—covering 1300 ft. of the Champion ore channel to the north-west—its stock ought to have bounded up at least 50,000. The permanency, the extent, and the richness of the ores in these claims unite to make them of great prospective value; but Mr. Probert unaccountably hesitated in securing so valuable a property though offered at so small a sum. If he had been asked 20,000 for the claims he might have instantly decided that they were certainly worth securing. This is the way English shareholders are too frequently served by their representatives in this country. In too many cases their agents ignore practical mining knowledge, and cling with tenacity to the prophetic utterances of some theorist totally ignorant of practice. Science and practice require to be combined in mining business. *Eureka, Nevada, Aug. 26.* J. D. EMERLEY.

#### NEWFOUNDLAND MINING COMPANY.

SIR.—At the conclusion of Dr. Webster's address at Wednesday's meeting, and after Col. Fielden had risen to say that it was owing to his high regard for Sir A. Malet's personal character that he had advanced "the considerable sum of money" to the company, a shareholder rose and put, as I thought, a very pertinent question to the Chairman. In a circular issued in May last it was stated that the company had a balance of 2000l. in the Bank. It was, I say, a very natural question to ask, and one which arose immediately from the report just issued—what had become of this large balance, if it had been found necessary to borrow "a considerable sum of money" to meet current liabilities? The Chairman, however, ruled that such a question was out of order, and no reply was in consequence given, and the business of the meeting was at once declared to be over. Now, Sir, I travelled 150 miles in order to be present at this meeting, hoping thereby to obtain from those able to give it a true and accurate account of our affairs. But if shareholders are immediately declared to be out of order as soon as they rise to ask questions which may reveal unpalatable truths if honestly answered, they must not be expected to agree to the statements those who are in office and in the secrets of the company are ready to make without suspicion that there is something kept back which would materially qualify the truth of those statements.

It did not transpire at the meeting what this considerable sum of money which Colonel Fielden has advanced is. The term at the least is very vague; it may be 500l., or it may be 5000l. On what principle can the directors borrow large sums without at least informing the shareholders, and what good end is gained by withholding such information when asked for? Colonel Fielden at the meeting recommended the shareholders not to part with their shares. Such advice was at least unnecessary, as the shares have been quite unsaleable for the last twelve months. A SHAREHOLDER. *Sept. 17.*

#### THE NASCENT COPPER PROCESS.

SIR.—I am obliged by the prompt response made to my appeal for information by Mr. Stephen H. Emmens. My name could add no authority in such a case, hence I did not give it, and my allusion to Mr. John Longmaid and others who had written in your columns was intended only to point out that I was not solitary in my doubts about the novelty of the "Nascent Copper Process." While I readily express my thanks to Mr. Emmens, there are still certain discrepancies which I should be glad to find him supplying in the case as it presents itself to my mind. I am, however, glad to find that the smallness of the royalty is likely to go some way in avoiding undesirable litigation, and hope this may prove to be so, although the history of the patent for using the hot-blast process in the manufacture of pig-iron, which so completely revolutionised that manufacture some forty years ago, does not support his hypothesis.

In his letter three points are laid down:—1. The nascent condition of the copper.—2. The use of hot brine to the extraction of the copper.—3. The use of steam before the precipitation of silver.

Now, my doubts upon all these arise from the conviction that there is no new principle adduced, nor any which was not before well known to chemists, and acted upon. In the molecular condition of the copper at the moment of deposition there is nothing new, as from time immemorial scrap-iron has been used to cause the deposition of what Mr. Emmens would now call "nascent copper;" but all cement copper at the moment of deposition is exactly what he calls "nascent." The employment of the particular process does not alter the molecular, nor indeed any other, condition of the copper, so as to make "nascent" different from "cement" copper. A new name for an old process does not furnish new facts.

Mr. Emmens states that "the use of hot brine as a lixiviating agent has in all former processes been restricted to the treatment of silver ores, and has never hitherto been applied to the extraction of copper;" and that an improvement has been made in the precipitating as well as in the lixiviating tanks. Possibly; but he adds—"The only prior example of this is to be found in Claudet's process, but there the jet of steam is applied after the precipitation of the silver, and solely to assist the copper precipitation." To show how far there is anything new here, I quote from pp. 195-6 "Weale's Metallurgy of Copper," 1867 edition—"The circumstance long known to chemists that the chloride of silver is somewhat soluble in a concentrated solution of common salt was taken advantage of by Augustin, in an ingenious plan for separating silver from copper. At Freiberg this process is in successful operation. A matt holding 60 to 70 per cent. copper and 4 per cent. silver is powdered and roasted. It is roasted a second time, and near the end of the process 5 per cent. of salt is added, which changes the silver into chloride. This is roasted powder . . . is treated with hot brine, which, filtering, carries with it the chloride of silver. It is brought into contact with copper, which throws down the silver as cement silver. The copper . . . is thrown down as cement copper with metallic iron." The process here described appears in principle to be identical with the "Nascent Copper Process," for we have—1, the roasting with salt; 2, the extraction with hot brine; 3, the precipitation of (and) the silver by copper; and 4, the copper by iron. Whether Mr. Emmens' "minor" and "major" principles bear any analogy to Augustin's process he does not show; he "reserves" them, and does not feel called upon to "disclose" them. But as a condition precedent to obtaining a patent is a disclosure of the thing claimed as new, we may at least infer that they form no part of this new patent, else they would have been disclosed in the specification.

If it be objected that Augustin's process dealt with matt, or regulus, and not with ore, especially with low-class ores, as the "Nascent" process does, the following extract from "Crooke's Select Methods" will be rather conclusive on the point—p. 177, eighth edition, 1871—"The residue from iron and copper pyrites in

the manufacture of sulphuric acid is called 'burnt ore.' 'Burnt ore' contains, on an average, 4 per cent. copper, and 18 dwts. silver to the ton. This was formerly smelted for copper, but for several years past a large proportion of the burnt ore has been worked by the wet process of extraction." "By this process the burnt ore is ground, sifted, and roasted with common salt until the alkaline salt is converted into sulphate of sodium, whilst the copper is transformed into a soluble chloride." "The copper salt is subsequently removed by repeated washings, and the copper precipitated by iron in the metallic state. It has been long known to those engaged in this business that the copper precipitate produced not only contains a notable quantity of silver, but also distinct traces of gold." "For the purpose of removing the soluble salts from the ore hot water is employed, and, as a large proportion of the chloride of sodium (i.e., salt) used remains undecomposed, it (i.e., hot brine) acts as a solvent for the chloride of silver produced during furnacing."

It thus appears to me that copper ores of low class have been treated both with common salt and subsequent lixiviation by hot brine—for hot water and salt is "hot brine"—and this seems as if it were in opposition to the statement of Mr. Emmens. If, however, my opinion is untenable I shall be glad to be put right by that gentleman, and I beg to assure him that I write in no humour to mar his progress in applying his chemical researches to the production of metallic results. I only wish to mark the points of progress actually reached in this nascent process, if any.

MINE ADVENTURER.

#### COAL MINING IN ITALY—THE SASSO FORTE COLLIERIES COMPANY.

SIR.—I cannot agree with a "Large Shareholder's" letter (published in the *Mining Journal* of Aug. 29), in which he professes to answer Capt. Jacob's questions, which I must say appear to me to be perfectly fair, and deserving of a satisfactory reply from the board of directors, rather than from a shareholder, who, however "large," must have derived his information secondhand. He states that he has taken the trouble to dive into all these questions, and to have made himself completely master of them; but, from the tone of his letter, it is very evident that he has taken a "header," and plunged into an unknown sea of confusion. With the large stake which he professes to have in the company, he would have been a wiser man had he gone out to Italy, and seen with his own eyes how matters stood at the mines; and had he done so, as I have done, I am prepared to say that he would have taken a very different view of affairs.

If 10,000l. have been spent in Italy in works, plant, and machinery, all I can say is that the greater part of it must have been most ruthlessly squandered, and the company have but little to show for their outlay, and that if one-half of this amount had been spent judiciously the mines might now have been in a flourishing condition, and the company in a position to take regular contracts for the supply of coal. As to the necessary steps having been taken for opening out the colliery, that is all "moonshine," nothing has been done in this direction; and as to being ready in about two months time to raise 300 tons per day, it is evident that a "Large Shareholder" has been misinformed, let us hope not wilfully, but rather through the ignorance of those whose duty it was to have made themselves thoroughly acquainted with the subject.

I have had no opportunity of "diving" (as your correspondent would say) into the accounts, but as to the excavation of the coal having only cost 2s. 6d. per ton, it is a convincing proof to me that the board in London (which I believe is composed of honourable gentlemen) is labouring altogether under a false impression. With regard to a profit of 20 fr. per ton having been made on the sale of the coal at Leghorn, I am afraid that a "Large Shareholder" is no accountant, and has mistaken the debtor for the creditor side in the books. If I were to say that the loss on every ton of coal sold was four times 20 fr. I believe that I should be nearer the mark.

Although I have not a penny at stake in this undertaking, I am quite as desirous for its welfare as a "Large Shareholder," and were I not perfectly convinced that his letter was written in good faith, but under a false impression, I should not have troubled myself to put him on the right scent, and to urge him and other shareholders to go to Italy and judge for themselves.

The sooner matters are put upon a proper footing the better it will be, not only for the Sasso Forte Collieries Company (Limited), but for all other mining enterprises in Italy, as the stagnation in the affairs of the company reflects undeservedly on undertakings of a similar nature in that country. It now remains for the shareholders to put their shoulders to the wheel, and bring pressure to bear upon the directors, so as to compel them to do their duty, and by a reorganisation of their management in Italy to prevent the affair from drifting into "Queer-street." Unless they do so without delay his company will very soon become the laughing-stock of Italian speculators, and prove to them that the "Ingleses" possess more money than wit.

I thoroughly believe when once things are put straight that this company will very soon become a paying concern, and lead the way for the employment of British capital in opening out, not only new collieries but also copper, lead, and other mines in the Maremma. *Florence, Sept. 11.* A LOOKER-ON.

#### SASSO FORTE COLLIERIES COMPANY.

SIR.—I rejoice to find that Capt. Jacob does not write "spitefully" against the company, and reiterates as strongly his opinion upon the goodness of the coal. His letter to you of the 3rd inst. will, I am sure, do him and me, as shareholders, a great deal of good. Indeed, we at all required it from ample publication. I only desire, as he does, that the truth should be known, because it will not only show the soundness of our undertaking, but also benefit immensely that poor but honest and struggling country of Italy. With regard to Mr. Jacob's observations and questions I can reply *seriatim*:

1.—Whatever claims Belletini or Ferrari may establish will be amply provided for out of the shares still to come to the vendors, who have guaranteed an unimpeachable title. Signor Pardossi, of Leghorn, has advised the company upon the whole question, and he says the title is perfect. If Montelli, one of the vendors, has spent the company's money on other people's property he will simply have to refund it. At present he denies having done so.

2.—This requires no answer.

3.—The company would be indebted to Capt. Jacob if he gave "full particulars of the name and amount due to each proprietor" of land through which the road runs. As Montelli stated that he had to pay now but a small sum of 9l., he will have to pay for any errors he may have committed by way of trespass or otherwise. There is plenty to meet any possible claims, but the company does not intend to submit to extortion from anyone, even in Italy.

4.—The road will not be useless when the railway is made. This is one of Capt. Jacob's dogmas. The road will be very useful for many purposes afterwards, and will be cheap at the cost he mentions.

5.—Explorations have been made quite sufficient for all practical purposes, and Capt. Jacob's own plans for working are founded upon a conviction of the extent of the coal; unless, indeed, he wishes to stultify himself, and he is far too shrewd a man to do that.

6.—There is no doubt if this be true it only shows egregious bungling on the part of Montelli, who, I understand, has got up a personal quarrel with Jacob, because he is going to marry his sister-in-law, but why he did not supply the proper amount of timber will be a subject for future investigation. As to what the colliery can be made to produce in two months I entirely join issue with Capt. Jacob. If he cannot produce 300 tons a day in that time, all I can say is he is no engineer.

7.—The value Capt. Jacob puts on the plant and machinery is simply preposterous. Perhaps, according to the English scale, it is nothing, but it must be classed along with buildings and dead work, timber, &c. The whole is far less than the cost of similar things here. If when Capt. Jacob was armed with authority he did not see the accounts it must have been his own fault. The accounts are in course of publication, and will quickly and easily demonstrate the cost of raising and carrying as distinguished from the other work. How does Capt. Jacob know "an agent and six or seven men were employed in Leghorn?" I find the directors do not know it. But even



if so, considering wages are only 1½ lire per diem, or 1s. 0½d., it is quite possible to employ more than three men at any rate for 17. a-week, and these would be more than sufficient to attend to the store at Leghorn.

8.—I am afraid Capt. Jacob's proof of the profit on the coal is not to be trusted. It is clear he does not understand figures, nor what expenses are properly applicable to raising—what goes against income, and what against capital. He had better apply himself more diligently to his own science.

9.—Mr. Camillo Montelli is responsible for this statement, and he will no doubt make it good. The directors intend to call upon him to do so, but after all there is not much in it.

10.—This is not so easy to see. If our coal is superior to Ferrari's, and Capt. Jacob himself has said that it is, there is no reason why it should not fetch a better price. In fact it does so already.

11.—In this I agree. 12.—Ditto. 13.—Ditto.

14.—For this Montelli will be called to account. But it must not be supposed that it in any way injures the company. A franc is only 5½d., and this is a matter which can be set right in a moment.

15.—I agree. 16.—Ditto.

17.—How does Capt. Jacob know the company's horses threshed the corn of Leopold Andreini? I should like him to prove it. How does he know they brought materials to the theatre? How does he even know they were the company's horses? Who are the persons who have hired the company's horses? Let him prove all these things. Let him show their vast importance to the undertaking. Let him turn mole-hills into mountains, but always let him forget the true interests of the undertaking. Let him magnify pettifoggery details into monstrous and calamitous abuses, and then turn round upon himself and ask whether he has a sweet temper. Now, I tell Capt. Jacob plainly that if he conducted himself with more dignity, both in person and in print, he would have better occasion for his wrath, and find more play for his scientific skill. In all affairs of business there is a large and wide-minded view to be taken, as well as a cramped and crabbed one. Mining especially panders to selfishness, and the sooner we all throw it off the better.

London, Sept. 14. A LARGE SHAREHOLDER.

#### CLIMATE AND LABOUR IN ICELAND.

SIR.—I have read with much pleasure the interesting letter from Mr. Jón A. Hjaltalin in last week's Journal. He is, I am truly thankful to say, quite right in supposing that I never spent a winter in the sulphur mines of Iceland. I had no idea that the climate of that favoured island was so charming as he describes it to be, for I had been deceived by some expressions in a contrary sense used with respect to the winter there by Capt. Burton, a traveller whose authority on such matters stands very high in this country. Perhaps Mr. Hjaltalin is thoroughly acclimatised, and enjoys every bracing weather. I really did not mean to convey the impression that it would be impossible to get any natives to work at the sulphur mines. But, although owing to the latter being 23-4-5th, 40 or 45 English miles or knots (it is not quite clear which, but, at any rate, at a considerable distance) from the coast, it did not strike me that any competition from sea-fishing in the immediate neighbourhood was to be apprehended. I still consider that there is no likelihood of a sufficiency of hands being found to raise ore enough to make for two years 17,515 tons, and afterwards 52,546 tons, of sulphur per annum.

BRIMSTONE.

#### SULPHUR IN ICELAND.

SIR.—I feel that I can add but little to Dr. Blake's pamphlet and letter in proof of the great difficulties in the way of successfully working sulphur mines in Iceland, but I must apologise for having in one instance misunderstood him. The following passage occurs in the pamphlet:—"Italy, in the year 1870, exported 52,546 tons. From the comparison between the relative formations there is every reason to believe that as large a quantity can be exported from Iceland as from Italy." I unfortunately took this to mean what it said, until I found in Dr. Blake's letter that "it is obvious that the statement of the export of 52,546 tons into England (!) from Italy left the question of the total products of sulphur from Italy entirely open." The fact is that there is a little obscurity here and there in the pamphlet, and I would suggest some revision before the next edition is published. By-the-by, it may be interesting to mention that the quantity of brimstone imported into England in 1872 was 50,049 tons, value 336,216*l.*, but in 1873 only 45,467 tons, value 299,727*l.*

The special acquaintance which I claim is with the mode of manufacture and with the sale of sulphur. I have not been to Myrnat or Fremzinnar, nor have I been shown anything which leads me to suppose that it would be commercially profitable to me to go there. My ideas respecting the value of Icelandic sulphur deposits have been deduced in a great measure from Dr. Blake's pamphlet, and to a certain extent also from knowing that some business of the kind has been industriously hawked about the city for a very long time past without success. I read the pamphlet with all the attention it deserved, and stated that the distance from mine to port was 45 miles, because I understood so from Capt. Burton's report at page 33; and this, moreover, is nearly corroborated by a diagram elsewhere. Afterwards, Capt. Burton certainly says that the concession lies 25 direct geographical (23-4-5th English) miles from Husarik, but roads are often winding. I did not dispute Dr. Blake's quotation of current freights, but I have little doubt that the eminent shipowner will bear me out when I say that an increase of 17,515 (soon to be 52,546) tons in the exports from a place, without any corresponding increase in the imports, would have a tendency to raise the rates. Besides, Dr. Blake has forgotten to estimate for such necessary little items as loading, lighterage, harbour dues, interest on expenditure in improving Husarik, brokerage, &c.

However, I cordially agree with Dr. Blake that the subject of interest is whether we can get sulphur from Iceland cheaper than from elsewhere. A tolerably simple way of forming an opinion on this subject would be that the persons interested in the concessions should engage an engineer of high repute to inspect and report on them. I have the honour of being acquainted with Capt. Burton, and have the greatest respect for him as a traveller, but none whatever as an inspector of mining properties.

BRIMSTONE.

#### THE COPPER PRODUCTION OF CORNWALL AND DEVON.

SIR.—In answer to several correspondents on the subject of Cornish and Devon Copper Mines, I regret to add that South Caradon, Glasgow Caradon, and West Tolgus are the only three remaining mines that can correctly be recognised as paying properties, though it is known that on the skirts of the Dartmoor there are several shallow, extensive, and highly crystallised mineral lodes that, doubtless, would well remunerate capitalists could the lands be obtained for mining purposes and upon liberal terms from the landlords. I may add, however, that it is easy to trace the decadence of copper mining in the South-West. My records extend back to the year 1762, just 112 years ago. For the 20 years ending 1781 the average produce was 12 per cent., and the standard fluctuated from 81 in 1770 down to 68 in 1773, up to 83 in 1779 and down to 70 in 1781. The respective values of ores were, therefore, at the dates referred to 7*l.* 5*s.* 8*d.*, 7*l.* 4*s.*, and 5*l.* 13*s.* For the next ten years the records, so far as my researches carry me, are wholly imperfect and unreliable. The next decade, closing the century 1800, are also imperfect, though I gather that the products of ores advanced from 16,437 tons in 1764, to 88,122 tons in 1782, and receded to 54,981 tons in the year 1800, with a standard of 133 to a produce of 9*l.* (or say) 9*l.* 11*s.* per ton of de-precated ore. The next 20 years reduced the average produce of metal to 8½ per cent. The range of the standard being up to 169 in 1805, down to 99 in 1816, closing 114 in the year 1820; the respective prices of a ton of ore at the several dates being 11*l.* 5*s.*, and 6*l.* 10*s.* At this period, 1820, the importation of copper ores from abroad commenced, and steadily increased for the next quarter of a century, the respective products of Cornwall and Devon, compared with foreign ores, being 12,315 tons of metal at this date (1845), as against 10,348 tons, and the average produce 73 and 163 per cent. During this period the standard ranged from 124 in 1825, to 99 in 1831, up to 121 in 1842, and falling to 104 in the year 1845, to a produce of 73. At the close of the half-century, 1850, the average produce and standard were precisely the same. I have not time to work

up the statistics to a later date upon this occasion, but will refer to them again at an early date. I may add, however, that the copper trade has at all times been subject to wide fluctuations, both as regard prices of ores, metal, and costs of production. The smelters have ever, within my memory, managed to regulate the production both at home and from abroad, as well as its commercial value, so as to generate gains into their own pockets. The largest quantity of ores produced in any year during the half-century was 159,551 tons (21 cwt.) in 1839, which was nearly threefold of that yielded at the commencement, but shows a falling off of 1½ in the produce, and of 4*l.* in price per ton of ore, (or say) from 9*l.* 11*s.* to 5*l.* 11*s.*

It is not the largest mine or that producing the largest quantity of ores that pays the shareholder best. Costs of production, facilities of locomotion, freedom from steam-pumping machinery, and, above all, sound management are required to secure profitable mining.

R. TREDINNICK,

Consulting Mining Engineer, and Dealer in Stocks and Shares.  
43, Bishopsgate-street, London, Sept. 14.

#### DIAMOND ROCK-BORING.

SIR.—The above system of boring seems to be coming in for extensive patronage, and although I have read some papers on the subject I have never seen any detailed statement of the time and cost of putting down bore-holes by the diamond drill. Perhaps some of your readers can furnish particulars of the cost and speed, and state what is the softest rock from which cores can be cut.

E. C.

#### PREVENTION OF RAILWAY ACCIDENTS.

SIR.—Some months ago you did me the favour of inserting in your valuable Journal a communication on a subject which appears to me to have received from railway engineers less consideration than I believe it merits. I refer to the geometrical adaptation of the tyre of the wheels of carriages to the rails. Many accidents have occurred since that time in corroboration of what I then said on the subject, and I observe in this day's papers the report of a similar one on the Midland Railway, between Barnsley and Cudworth, in consequence of the carriages leaving the metals. Many persons were much shaken and alarmed, and the way was obstructed for a long time by the broken carriages.

I am not observant that since this subject of a symmetrical connection between the rails and the carriage wheels was first suggested, many years ago, the flat rails have assumed a rounded form, and the tyres of the wheels have become less angular. But this has not been done with that mathematical precision required to preserve, under circumstances of frequent occurrence, the mechanical connection between them undisturbed. "A miss is as good as a mile," and I am persuaded that until the geometrical relation of the wheel to the rail shall be established, one element of safety to railway travellers will be absent.

Newton Hall, Chapel Allerton, Leeds, Sept. 14.

#### KIT HILL.

SIR.—Despite all the discouragements cast on mining by the depreciation of the commercial value of the products (particularly copper and tin), and the increased cost of materials and labour, the spirit of speculation has not been extinguished. There are measures in progress for resuming works in some shallow mines in which experiments have been made on a limited scale. Amongst others, I may mention that nearly all the mines on and around the celebrated Kit Hill, near Callington, are to be consolidated and worked by a London company, who have the command of an immense capital. The district is a good one, and the prospects, therefore, of success are very fair and encouraging to the investors. I cannot enumerate all the mines so consolidated, but I have been informed that they are 15 or 16 in number, including Kit Hill Mine, and all the other mines between that and Wheal Edward, and including the Edwards. The directors have employed a surveyor to make a map of the whole group. The success of New Great Consols in that district very naturally stimulates enterprise in the mines around. When I was last at that mine I thought of a project which was suggested a year or two ago by Mr. Vosper. It was this—to drive an adit from the valley near West Great Consols under Kit Hill, to intersect all the lodes at a depth of many hundred feet (nearly 1000) under its summit. All the metallic lodes intersected in its course could be wrought from thence to the surface without any machinery. The adit should admit of a tramway for the transit of all the debris and ore to the adit's mouth. The Hill is known to abound in lodes of tin and copper, some of which have already yielded in some of the mines considerable quantities of ore from shallow levels. Of course, a company undertaking a work of such magnitude should secure grants of all the land around for a good distance. The company referred to appears to me to be a proper one to carry out this scheme, because most of the sets in the locality are under grant to it.

Truro, Sept. 15.

R. SYMONS.

#### TIN MINING IN CORNWALL.

SIR.—As an adventurer in Cornish tin mines, I quite endorse the opinions of your correspondent, "Viator," in last week's Journal. A policy more suicidal than that adopted by tin miners at the present time is not possible to conceive. Let us, therefore (the adventurers), the parties most interested in the matter, raise our voices at the meetings of the mines in which we are interested against any further continuance of this policy. It is conceded that mines cannot work at a profit at the present price of tin. I allude to mines that have a fair production, and not to those which could not see a profit with tin at double the price: this being the case, the question which occurs is—Why produce any tin at all? when the producing it tends to prevent that for which we are anxiously looking—a rise in the standard. I look upon tin mining as I would upon any other business, and all men of business know that when the article produced is greater than the demand the price falls, and the production naturally decreases. Looking at individual mines, the effect of the fall in price appears to have stimulated managers to greater exertions, and in order to pay the cost they produced more tin; and thus, burning the candle at both ends, they do their best to keep down the price, and at the same time impoverish their mines. What I would suggest is this, that shareholders take into their serious consideration whether or not it is desirable to leave off producing tin. I could mention some seven or eight mines which if they were to adopt this course would raise the standard in a short time, always providing that Australia cannot send to a profit at 50*l.* a ton. If she can, then for obvious reasons tin mining in Cornwall under the present system must become defunct; but if she cannot, then under largely decreased production the standard must rise.

To my mind to lay the blame of the present state of the standard on the smelters is to put it on the wrong shoulders; we ought to look closer at home, and we shall then find that it is more our fault than theirs, for if we (the adventurers) continue to produce tin in larger quantities than are required we shall have to put up with a decreasing price; and as this means large "calls," let us for self-preservation adopt the best means in our power to remedy the evil; and these, I must say, appear to me to be to leave off producing tin, and reduce the expenditure to the very lowest.

F. B.

#### GUNNISLAKE DISTRICT—RECENT DIVIDENDS.

SIR.—My attention has been called to a paragraph in the Journal of Aug. 29, referring to the Tavistock and Gunnislake mining districts. This paragraph insinuates that two recent dividends are likely to be very prejudicial to the district. As I am a shareholder in the mine referred to I should like to know why? I invested my money in this adventure because it was well recommended by eminent mining captains, and promoted by honourable gentlemen of standing repute. I looked upon my dividend as fairly earned, and a proof of the soundness of my investment. Until your correspondent explains his ambiguous communication myself and partners can only draw one inference from the paragraph in question—"That we are the victims of deception on the part of the management." We are most unwilling to believe in this, and think such a serious imputation ought not to have obtained publicity unless supported by unquestionable proofs.

Sept. 17.

D. W. T. M. C.

#### WHEAL MARY TIN MINE.

SIR.—In consequence of a paragraph which appeared in your valuable Journal last Saturday I have received many letters, nearly all of which cast blame on me for the collapse of this company. I hope, Sir, you will allow me to occupy a small portion of your space to distinctly disclaim any such imputation, and to inform the shareholders in this and other mines with which I have been connected that I am preparing a pamphlet in self-defence, based on facts, with copious extracts from letters, reports, and conversations, which I feel certain will exonerate me from any impute motive in recommending the mines, and until such appears I trust your readers will defer their judgment. I feel most acutely my position in having recommended Wheal Mary to my clients and the public; but, Sir, I am sure I was justified in so doing at first. I cannot here enter into the details respecting the birth, growth, and decadence of the company—they will come by-and-by, but I must say that had the slightest spark of honesty been displayed in the local management the mine would have at this moment been paying dividends, and I can prove it, Sir, and I will prove it before long before 12 honest London merchants. I declare, in my experience of over 15 years in Cornish mining, I never saw such gross neglect of duty and disregard to shareholders' pockets as I

have seen in Wheal Mary and Castle an Dinas, and for which I am blamed because I found all the capital for both, and so ruined myself with a valuable connection, but of this anon.

I have merely taken a rough glimpse at this subject, but I will treat it in another form hereafter, for I feel that when I have a duty to fulfil I must do it boldly—truth or nothing. Ugly as truth is sometimes—legally libellous sometimes—yet I will, in the true interest of mining, speak the truth, however unpleasant.

11, King William-street, Sept. 18.

W. J. THOMPSON.

[As Mr. Thompson is preparing a pamphlet to explain all matters concerning the unfortunate position in which the several companies have been placed, we have thought it better to omit the personal remarks, especially as Mr. Martyn, Mr. Whitefield, and Capt. Parkyn would feel called upon to reply to the comments upon their conduct, and thus prolong a discussion which we do not feel disposed to encourage.]

#### WHEAL LUCY.

SIR.—I saw, in your valuable Journal of last week, that this mine is now being worked on tribute, and that there was sold recently a parcel of rich tin stuff at 28*l.* per ton, and that there is another parcel being prepared for the market of equal value. Allow me to say, Sir, that I saw a parcel of tin yesterday from this mine so rich in its nature that it was taken to the smelting works and sold at 46*l.* per ton, and the second quality at 28*l.* per ton. What a pity such a promising piece of mining ground is not more vigorously developed. Of all the mining speculations in the West of Cornwall I know of no more more likely to pay the shareholders than this mine.

ONE WHO WOULD LIKE TO HAVE AN INTEREST IN THE CONCERN.

Hyle, Sept. 17.

[For remainder of Original Correspondence, see to-day's Journal.]

#### Meetings of Public Companies.

##### LANESTOSA MINING COMPANY.

The fourth ordinary general meeting of shareholders was held at the offices, Queen-street-place, on Thursday,

Mr. W. COX in the chair.

Mr. H. SWAFFIELD (the secretary) read the notice convening the meeting.

The report of the directors stated that the total expenditure during the year has amounted to 4082*l.* 2*s.* 1*d.* This is an increase on the previous year of 712*l.* 19*s.* 7*d.* The increase in the returns of ore have, however, more than compensated for the increased outlay, as will be seen from the following figures:—Proceeds of ore, 12 months, to June 30, 1873, 915*l.* 6*s.* 6*d.*; proceeds of ore, 12 months, to June 30, 1874, 2434*l.* 2*s.* 9*d.* In presenting their report in August of last year the directors, whilst admitting that up to that period the result of the operations had been rather discouraging, stated that there were still points of promise in the mines, any one of which when further explored might open out ore in large quantities, in view of which they recommended the vigorous prosecution of the exploratory works. The shareholders approved that recommendation, and the result of the operations thus carried on has been the discovery in the Mine of Asuncion of ore in remunerative quantities, with the prospect of further improvement as the mines are deepened. Anxious to husband the resources of the company as far as possible, the directors in the autumn of last year requested Capt. Gifford to suspend operations in those parts of the mine where there was least prospect of getting immediate returns of ore, and to direct his attention principally to the Mine of Asuncion. This mine has since been vigorously worked, and much ore—especially lead ore—has been discovered. The satisfactory feature in this mine is that the lodes appear to increase in productiveness as a greater depth is reached. Capt. Gifford is of opinion that this will prove to be characteristic of the lodes in the other mines, so that there is now every encouragement to proceed with their development.

In consequence of the disturbed state of the country in the vicinity of the mines, Capt. Gifford has at times found it very difficult to proceed with the mining operations, and for some months he was compelled to suspend the raising of ore altogether. The exploratory works have, however, been continuously carried on. During May, June, and July it is estimated that the ore raised has fully covered the working and home expenses, and left some margin for profit. The time has now come when machinery and additional appliances should be provided for working the mine and dressing the ores; and as some capital will be required for exploratory operations, as well as to replenish the floating capital, the directors estimate that a call of 5*s.* per share will be necessary. Of this amount, 2*s.* 6*d.* per share will be required immediately, the other 2*s.* 6*d.* per share in a few months. The superintendent reported that San de Uso shaft was sunk 3 fms. 1 ft. 1 in.—a total depth of 34 fms. 5 ft. 4 in. The lode continues large; veins of lead were met with at intervals in sinking, but they were of no practical value. With the return of quieter times (in view of the successful developing of Asuncion) further explorations will have to be made here, as the lodes are continuations of those worked at Asuncion.—Aurora: Here the work has consisted only of a little tribute. It had been determined to erect whim and sink Pardo's shaft below the cross-cut through the lode at bottom, which is some 23 fathoms from surface, but, for the reasons previously given, this work has not been carried out, and it is very uncertain at present when it can be. The mine is very worthy of further trial, for the lode has yielded ore everywhere opened on along the back, and although as yet nothing of material value has been discovered in the deeper workings, the lode has increased in size, and it maintains its promising character.—La Berta: At this mine, Guillermo shaft was sunk 1 fm. 2 ft. 7 in., reaching with this a total depth of 11 fms. 3 ft. 1 in. The cross-cut adit was also driven 13 fms. 8 in., where it holed to shaft at a total length of 33 fms. 5 ft. 4 in. All the principal lodes were cut through by this cross-cut (except No. 4), and at No. 1 (where a little lead was met with in passing), a driving was made north and south 5 fms. 2 ft. 10 in., but nothing worth following was seen in it. The other lodes, although holding a little lead in small veins of fluor spar, were generally very hard and poor where intersected. From the formation of the ground here it would appear that the hard silicious rock in and about the lodes around our explorations, is a superficial cap only, and as the lowest depth reached is only 11½ fathoms, looking at the strongly marked mineralised character of the ground, and the number of large promising lodes within such a short distance of each other, I would recommend a continuance of the sinking here when circumstances permit, and especially so, as the shaft in going down will intersect the No. 4 lode, not yet seen in depth.—Asuncion: The operations during the year have given very satisfactory results, that go far to compensate for the non-success at other points. It may be remembered that, at the last general meeting, in sinking exploratory shaft a large cavern was holed out at 15 fathoms from surface, in which were found loose masses of calamine and lead, imbedded in mud, silt, and debris from the country rock, and seeing in extracting this ore that it held down a good shaft was commenced in bottom, and the debris from sinking used to raise it up through the cave until the latter was filled. This shaft proved that the deposit of ore was of sufficient importance to warrant the opening out of the point in a systematic manner, and the small, irregular surface shaft was accordingly cut down to enlance with the piece made in cave, and the name of Judd's given it; hauling gear was then put up, and regular explorations set out.

The ore raised during the last 13 months since the last general report is—as shown in the returns—298 tons 9 cwt. of lead, 214 tons 15 cwt. of calamine, and 134 tons of mixed ores. In these monthly returns the calamine was estimated in the crude, and after calcining it has been found to exceed the estimate by 18 tons 2 cwt., which, added to the former quantity, gives a total raising of 232 tons 17 cwt. of calamine. From these quantities, and the previous balance here, three cargoes have been shipped, and we have now a balance on hand of 76 tons 14 cwt. of lead, 82 tons calamine, and 128 tons of mixed ores. In connection with the question of ores, it may be noted that there is great difficulty to contend with in the dressing of large quantities, through the absence of springs or streams of water near the mines—for the little used at present we are indebted to rainfalls collected over a large area by drains cut across the mountains in different directions; and, should the necessities of the mines become greater, the making of reservoirs and collecting drains will have to be studied as an important subject. As will have been seen from the returns, a good proportion of mixed ores is being raised now—i.e., ores of calamine and lead so intimately combined mechanically that it is impossible to separate them with the appliances at hand—and the making of these ores available for the market is another important question. With a crusher and very serious loss of 8 tons of lead forcibly taken by the Carlists from the ore house in March last to make balls with. The fruitful source of extraction here—the levelling of black mail on carts passing up and down with produce of any kind—has been escaped hitherto, but not without begetting strong smuggling tendencies amongst us; there is no doubt, though, that our continued immunity is due greatly to friends at court, and to fears as to what our workmen would do should anything be done that would tend to close the mine, as I threaten will take place if we are interfered with; but, whatever may be the cause, I hope it will continue to exercise its influence. I would beg to add that it cannot fail to be noticed that, notwithstanding the drawbacks which have had to be contended with, the position of the mines has greatly improved since your last general meeting. Instead of, as then, having a number of mines that were promising only, we have now something of tangible value, which bids fair to develop into a source of considerable profit. During the last few months, since regular and systematic workings have been possible, the value of the ore raised has equalled the costs, and lately it has left a small margin for profits. It is true no extremely rich points have been opened out, and also that good lengths of levels have been driven through unprofitable ground, but it is equally true, and it is a very encouraging fact, that the lode has scarcely ever been seen entirely without ore. It improves in size and character the deeper we go, and the bottom levels good deposits of ore are being developed, which underlie the comparatively sterile ground gone through above it, and which are independent of the shoot first seen about the great cave. Other favourable points are the quick and cheap way in which the mine can be opened out, as evidenced in the work done through the past year. The timber for securing is a heavy charge, but, as more than a set-off, there is no cost for water. Without having a rich mine before us, then, the future may be regarded with a considerable degree of hope, and, unless there is a most unlooked-for change, we may fairly expect to bring the mines into a paying state, but before this is feasible considerable work will have to be done in opening out more ground, so that it will not be necessary to depend upon one or two places only to sustain regular workings. As at present situated, the raisings may be expected to vary between 60 and 100 tons per month, one-half being lead, and the remainder calamine and mixed ores.

The CHAIRMAN said the report of the superintendent explained the mode that was being adopted in developing these mines, and that they had not gone hand over head, as was explained at the last meeting. On the contrary, there had been every desire to husband the funds of the company and endeavour to develop one portion of the property so as to make it repay in some way for the work doing. With this view, instructions had been sent out for a cessation of



representatives of the shareholders, and not by him. Individually, he could not bind Mr. Applegarth in conducting business relations.



Mr. TOWSE suggested that Mr. Applegarth should be asked to nominate two shareholders. Mr. Applegarth said the first proposal was that five shareholders should be asked to nominate two directors, but it was now that the five shareholders should confer with the board upon the subject. If a committee were appointed they should recommend eligible shareholders without the board having a hand in it. The question was then put and carried by 35 to 6 votes.

Mr. BAXTER proposed that Messrs. Hale and Slater be re-elected auditors, on the same remuneration as before.

Mr. HAMMOND seconded the proposition, which was put and carried.

Mr. T. G. TAYLOR proposed that the meeting should henceforth be held half-yearly.

Mr. BAXTER seconded the proposition.

The CHAIRMAN said there could be no possible objection to such a course. A proposition was then made that the shareholders should be allowed to see the letter and telegrams upon their receipt at the office, but upon being put to the meeting it was lost.

A vote of thanks to the Chairman and directors closed the proceedings.

## GOLD RUN HYDRAULIC MINING COMPANY.

The adjourned general meeting of shareholders was held at the offices, Finch-lane, on Wednesday, Mr. W. D. ROTCH in the chair.

Mr. T. E. BRIGGS (secretary) read the notice convening the meeting.

The CHAIRMAN said the general meeting had been adjourned to the present time in consequence of the accounts not having been received from California in time to be presented at the general meeting. He regretted the absence of their Chairman, caused by the death of Lord George Manners. The accounts had been sent out, but there was nothing particular to which he need call attention. By the expense incurred in sinking the shaft the balance against the company was about 800*l.* in California. Since the last meeting a great deal of business had been done, and some expense incurred. The manager says:—

Aug. 3.—Have just struck bed rock; shaft 181 ft.; dirt very rich. Community excited over it.

So that their expectations had been fully realised and the following day the manager wrote:—

Aug. 3.—We struck very rich bed-rock. I shall to-day send you the prospect which I panned out of the dirt and rock; it is as nice lead gold as can be found, and proves to a certainty the vast amount of gold locked up in the Cedar, Sherman, and other claims in this vicinity. Had not found rich rock at the bottom of the shaft it would not have lowered the value of the property to my mind one iota, because it has opened to view a rich hydraulic bank—equal hard to find. The prospect which I send you, before handled, weighed  $\frac{1}{2}$  dwts., about 88-75 value.

The manager had sent them some specimens of pure gold, and describes it as "as nice lead gold as could be found," and says "there is excitement in the community as to how the lead lay." As soon, however, as their manager had satisfied himself as to the richness, and where the "lead" was, he very sensibly let the water in. Arrangements with the Miners' Ditch and Tunnel Co. had been completed, and in the result their manager had obtained his own way, the Gold Run Company having the right to wash their tailings and dirt through the tunnel for nothing. As to the financial position of the company he stated that, not having the money to run the tunnel, money had to be raised upon debentures, and it was satisfactory to be able to state the whole of the debentures had been taken among the shareholders, and the first remittance had been sent out, with instructions to push on the work as fast as possible. The fact had now been demonstrated that there was an abundance of gold, and that there was no want of means for washing it, while the money for running the tunnel had been obtained, and it would be started in October. When run in, and washing had been fairly commenced, there could be no doubt whatever they would have very large returns indeed. He was not going to prophecy, but he felt perfectly certain that next year when they met they would find his anticipations had been fully borne out. During the last few months the shares in this company had advanced considerably more than 100 per cent. in value, and they might safely conclude when the tunnel shall have been completed another similar advance would take place. He then moved that the report and accounts be received and adopted.

Mr. CHADBOURN seconded the proposition, and directed attention to the fact that the average yield of the gold as extracted was about 82 per "pan," which was very rich indeed. The gold, too, was smooth, which was an indication of what was known as "lead gold"—that is, gold on the "lead" of the old river channel.

Mr. RICHARDSON said the hydraulic ground yielding even 82 per ton was extremely satisfactory.

A SHAREHOLDER thought a few cents per ton was the average of other hydraulic claims.

Mr. CHADBOURN said as low as 5 cents per cubic yard would pay well.

Mr. DUNN, in reply to a question, stated that the "blue lead" was some 300 ft. wide, and the course of the claim was 1300 ft.; there would be washing for 15 years, independent of hydraulic dirt.

The report and accounts were received and adopted.

A vote of thanks to the Chairman and directors closed the meeting.

## NEWFOUNDLAND MINING COMPANY.

An extraordinary general meeting of shareholders was held at the City Terminus Hotel, on Wednesday.

SIR ALEX. MALET in the chair.

The CHAIRMAN said that the circular which had been issued would have informed the proprietors of the reason for calling them together. The directors had been guided in their action by a wish to inform the shareholders as to the state of their affairs. Mr. Webster, who had been to Newfoundland to see the mine and look into matters, would give them an account of his visit. They would then be able to form their own judgment. The board only asked for the sort of indulgence which was the due of honest intentions. There were matters which at a public meeting like that, and with the law of libel hanging over their heads, it was difficult to advert to, and if he gave expression to his opinion he might lay himself open to the action of that law. Whatever had happened had in no way diminished the directors' confidence in the productive qualities of the mine. Colonel Fielding had come forward with some pecuniary assistance. They had received a very encouraging telegram from Capt. Bradley, at St. John's.

Mr. WEBSTER said: I have been called upon to relate to you the results of my visit to the property. Perhaps I shall have to say disagreeable things, but it is well that you should know the worst. I will keep as near to the form of the circular as I can. The circular informs you that the expectations contained in the first annual report have not been realised, and the cause of this may be summed up in a few words. In the first place it is no fault of the mine, neither is it the fault of the management at home, but it is solely through the fault of the management, or rather mismanagement abroad. Self-aggrandisement has been paramount over your interests. This I am happy to say is not irremediable, the worst is the delay and expense. We shall want more time to realise the expectations shadowed forth to you. At my visit to the mine, in 1873, I was miserably deceived in many of the statements made to me, and in no case more so than in that of the labour question. I was told men obtained higher wages there because of the fisheries, native labourers refusing to work at the mines when the fishing season came round. This became a very serious question with our directors last year. Under the advice of our manager the question of the importation of skilled labour was gone into, and ultimately entertained. At considerable expense to the company a number of miners were sent out. For some time the reports which came home from the manager led us to believe he was entirely satisfied with the body of men sent him, and for a time all was *couleur de rose*. In the month of February, however, we received information that things were not quite so favourable as they ought to be on our property. We hoped that things would go on smoothly, and that this discontent would calmly subside. In April we received the startling telegram:—

"Four men are in goal for assaulting the captain; nineteen men have deserted from the mine."

This was a very serious matter, the result of which was that the police had to interfere; they went round, and the telegram I have read was the result. At the crisis it appeared to your directors essential that some one should go out. We had the advice and assistance of a gentleman, a resident in Newfoundland, at that time on a visit to England; that gentleman was Mr. Harvey, one of our largest shareholders. The result of the conference with him was that I arrived at the mine on June 3. There was no lack of information as to the state of affairs. I then discovered the fallacy of the statements in reference to labour which had been made to me in the previous year. The difficulties were due to the bad name the mine had acquired through the bad management which prevailed. On June 8 nineteen actions for breach of contract were imminent in the Courts of St. John's. I had only one day to talk over matters with our late manager. On the 5th he was obliged to go with Captain Overman, and to take the books with him as evidence in these actions. Consequently I had no evidence to substantiate the charges I had heard against him; even if I had I am not sure that it would have been politic to have shown any distrust then. In the first place, he was an important witness against these men. The alleged breach of contract was that he had discharged them; this he denied on oath. In the second place, his term of office had expired, and he might have refused to appear, and the company have been mulcted to a very considerable extent. On

June 7 the first action was tried, and went against the company to the amount of 15*l.* damages. Upon the second action the jury were unable to agree. From the 5th to the 18th my time was taken up with a general supervision of the mine, seeing our stores and stock-taking. This soon furnished me with ample proof of the exorbitant price which had been charged for everything to the miners. On June 22 I received an urgent summons to go to St. John's. As I told you, this second action had resulted in a drawn battle, and a skillful move was resorted to on the part of the plaintiffs. The sitting of the Court had nearly expired, and they petitioned for a prolongation of the sitting on the plea that as the Court did not sit again until November it would be unfair to the men. On the 24th I reached St. John's, in consequence of that summons, at 2 P.M.; at 11 A.M. our manager had sailed for New York. I remained in St. John's for a fortnight, and I was occupied during that time with interviews with the Governor, his court, the Attorney-General, and the whole tribe of malcontents, of whom there were 19; in fact, the hotel at which I stayed was besieged by the Irish contingent. Under the circumstances I was advised to compromise the actions, and I settled them for 400*l.* Subsequently I returned to the mine, and my attention was directed to the very item mentioned in the circular, and that was the shipment of ore. I should only have been too glad if our expectations had been realised. When I got back I found such a thing as to get a cargo was utterly impossible at present. There has been great carelessness in hauling the stuff; it has all been mixed together, thus entailing trouble and expense. Out of every 100 tons we shall only get 10 instead of 30. You will only get one cargo instead of the two which we should have had. To return once more to the labour question I am happy to tell you that a more liberal policy has succeeded, and a supply of native labour is now obtained. I do not consider the condition of the mining labourer is at all bad. He can earn 5*l.* a month, can keep a pig, a cow, and sheep, and has a house to live in, and, so far, is satisfied. Amongst all the mistakes there has been no falling away in the yield, and we are still taking out from 2 tons to 3 tons of ore per fathom. Our books will be over soon, and will be submitted to careful scrutiny, and I am almost satisfied we shall have rather a heavy account against our late manager. We cannot guarantee any man's honesty. We only ask you to exercise patience and forbearance, and the time will come when you will reap substantial profits under our new manager, Capt. Bradley.

Colonel FIELDER said he had only one word to add to the very lucid report of Mr. Webster. Nothing but the high opinion he had of the Chairman and his colleagues would have induced him to make the advances he had, and he hoped the shareholders would place their confidence upon the board. He only recommended them on no account to part with their shares.

After a few remarks from the body of the meeting, during which a shareholder expressed the utmost confidence in the directorship, the Chairman declared the meeting at an end.

## CWM ELAN MINING COMPANY.

An extraordinary general meeting of shareholders was held at the London Tavern, Bishopsgate, on Tuesday.

Mr. C. ELEY in the chair.

The SECRETARY read the notice convening the meeting.

The CHAIRMAN said they had all been made aware that it was absolutely necessary to provide additional money to enable them to continue the working of the property—a property, he would say, he believed to be a good one, and one which offered great encouragement for the expenditure of more money; but it was evident that the majority of the shareholders did not concur with the directors in that opinion, for of the 6000*l.* which the directors had been given power to raise only 1919 shares had been taken up by the shareholders, to whom they were offered *pro rata*, representing only 10,000*l.* out of the 60,000*l.* of which the original capital consisted. Under these circumstances the directors considered it their duty to bring the matter before the meeting, in order to learn what is to be done in the future. Unless the means were provided for the development of the property the concern must, to use a familiar expression, come to grief. It was not a question of credit, as they were in a position to pay all their debts. They were not wedded to the idea of winding-up, and considered it much more desirable that all should take up their share; but as only one-third of the capital had responded to the appeal, it was unlikely this would be done, and he was told that it would be wrong of them to ask those representing one-third to put down more of their money to resuscitate the whole concern, when the remaining 20,000*l.* would contribute nothing. The mine appeared to be one of great encouragement, and he certainly felt surprised that a body of gentlemen who had purchased their shares at high prices should now leave it without the comparatively small further outlay which would keep it going. The value of running creditors 340*l.*; loans, 418*l.*; estimated two months' costs, 250*l.*; and sundries making up the total to 1078*l.* On the other side there was cash at bank, 54*l.*; arrears of call, 744*l.*, of which, he thought, about 600*l.* would be recovered, but it would take time to get in; the ore, lead, and blende was worth 172*l.*; and other creditors, 17*l.* or 18*l.*; making 844*l.* in all. He would be pleased if anyone would propose an alternative.

Mr. NIX enquired why they could not advertise and get the public to come in upon debentures or some similar arrangement?—The CHAIRMAN considered it unlikely that when only one-third of the shareholders showed any confidence they would get any assistance from the public.

The resolution for voluntarily winding-up was then agreed to, Messrs. C. Eley and Wm. Liddall being appointed liquidators, the proceedings terminating with the usual vote of thanks to the Chairman.

## EAST POOL MINING COMPANY.

The two-monthly meeting of shareholders was held at the mine, on Monday. Mr. R. R. BROAD, who occupied the chair, said that no one more lamented the death of their late manager, Capt. Garby, than himself, he had known him intimately for a great many years, and could assure them that he was a man of no ordinary attainments, for one had only to enter into conversation with him to find that he possessed a considerable amount of learning and powers of research. Capt. Garby's attention to his duties was beyond all praise, and he was sure his fellow-shareholders felt with him that they had been deprived of a man who had, in many ways, proved the value of his services, and who was respected by all who knew him.

The accounts were—Two months' labour cost, 2589*l.* 4*l.* 1*d.*; merchants' bills, June and July, 1332*l.* 16*l.* 11*d.*; dues, 148*l.* 1*s.* 7*d.*; total, 4068*l.* 2*s.* 7*d.*—Copper ore sold, 741*l.* 9*s.* 9*d.*; tin ditto, 3389*l.* 2*s.* 7*d.*; arsenic, 280*l.*; tungstate of soda, 142*l.* 12*s.* 3*d.*; burning, and income tax on dues, 27*l.* 10*s.* 2*d.*; total, 4560*l.* 14*s.* 9*d.*—leaving a profit on the two months' working of 492*l.* 12*s.* 2*d.*—The following report was read:—

Sept. 14.—Great Lode: The 180, driving east of engine-shaft, is worth for tin 22*l.* per fathom. A rise west of the engine-shaft, at this level, on cross-course, is worth for tin 20*l.* per fathom. There are four stopes in the back of the 180—two east of shaft, worth for tin 20*l.* per fathom; the other two west, worth for tin 16*l.* per fathom each stoper. There are four stopes in the back of the 170—one worth for tin 20*l.* per fathom, the other three 16*l.* per fathom each stoper. The 160 is driven west of cross-cut 5*l.* fathoms, and is worth for copper and tin 22*l.* per fathom. The winze from the 130 communicated with this level. A stope to the east of winze, in the back of the 160, is worth for tin and copper 15*l.* per fathom; and one to the west, in the bottom of the 150, worth for tin and copper 18*l.* per fathom.—Engine Lode: There are two stopes in the back of the 160—one worth for tin 12*l.* per fathom, and the other for tin and copper 20*l.* per fathom. A stope in the bottom of the 140, east of engine-shaft, is worth for tin 15*l.* per fathom.—South Lode: A stope in the back of the 150, east of cross-course, is worth for tin 12*l.* per fathom. The 130 is driven east of western cross-course 18 fathoms, and is worth for tin and copper 20*l.* per fathom. The 130 is driven east of western cross-course 25 fathoms, and worth for tin and copper 16*l.* per fathom. We expect to communicate these two levels in a month. There are two stopes in the bottom of this level worth for tin and copper 18*l.* per fathom each stoper. By the hoisting of the winze to the 160, and the communication of the east and west levels at the 130, there will be opened up a valuable piece of ground, which will give increased facilities for our returns in the future. In thus presenting you with this report, we cannot but regret the loss sustained in the sudden death of our esteemed colleague and manager, by his having been so unexpectedly taken from his sphere of usefulness.—JOHN MAYNARD, JOHN HOSKING.

The CHAIRMAN said that a meeting of the committee would be called at an early date to consider the provisions for the future agency of the mine, and Mr. Richard Martin kindly consented to take the financial part in the interim. With respect to the underground operations, the present agents he considered quite competent to carry out the undertaking, and he was thoroughly satisfied to leave it in their hands.

Mr. RULE made very strong objection to Mr. Martin's appointment, and in the course of his remarks strongly condemned the committee, and said there was no purser required.—The CHAIRMAN emphatically denied the statement made by Mr. Rule; and Mr. DENNIS, Jnr., said Mr. Rule had no right to make the remarks he had, as they were very offensive. Of course he had the power to propose any resolution he thought proper.—Mr. RULE replied by attacking the Chairman and some other members of the committee individually.—Mr. DENNIS said he was astonished at the bad taste of Mr. Rule in making use of the late Capt. Garby's name in the way he had. Capt. Garby might have been misunderstood by some persons, but he was quite sure Capt. Garby would have been shocked, if he had been alive, to have had his name made use of in the way Mr. Rule had done.—The CHAIRMAN emphatically remarked that "Mr. Rule must have a face of brass to make such charges," and refused to listen to anything more he had to say.—Mr. RULE then proposed that the committee be dissolved, but on its being put to the meeting only the proposer seconded it, and it was lost by a large majority.—Mr. HARRIS, of Pool, proposed that the committee be retained.—This was carried by an overwhelming majority.—Capt. MAYNARD said he had been an agent of the mine for 14 years, and had never heard the late manager say anything objectionable of any member of the committee.—Capt. HOSKING said he thought it could be hardly possible for Capt. Garby to have expressed himself as mentioned by Mr. Rule. He had worked for no one man, but for the whole body of the shareholders.

On the motion of the CHAIRMAN, seconded by Mr. HARRIS, it was unanimously resolved:—"That the gentlemen in East Pool having learnt with much sorrow of the sudden decease of their highly respected co-adventurers, manager, and friend, Capt. William Symons Garby, who for 21 years was connected with the mine, at this, their earliest account meeting, hasten to record their deep-felt regret for the sad bereavement, as well as to express their profound sympathy with the afflicted widow and family in the irreparable loss they have sustained. They further resolve that a copy of this resolution be transmitted by the Chairman of this meeting to Mrs. Garby, accompanied with the expression of their respective condolences, and with their sincere hope that her young family and herself will be amply sustained by a beneficial Providence in this their moment overwhelming sorrow and affliction."

It was also resolved that Mr. Richard Martin be appointed financial agent for the present, subject to a special meeting of the committee and confirmation by the adventurers at a subsequent one, this being necessary by the demise of Capt. Garby.

WEST BASSET.—The three-monthly meeting was held at the mine, on Tuesday. Mr. Daubuz presiding. The accounts presented were:—Labour costs for three months, ending July 17, 5424*l.*; merchants' bills, 2915*l.*; balance in

favour of mine, 134*l.*; total, 8473*l.*—Credits: Balance at last meeting, 236*l.*; sale of copper ores, less dues, 560*l.*; sale of tinstone, less dues, 379*l.*; sale of tin ores, 73 tons, less dues, 3881*l.*; total, 8473*l.*—showing a loss on the three months' working of 101*l.*, and a balance in favour of the mine of 134*l.* Capt. Evans explained that the merchants' bills included a large sum for new machinery and builders' charges, and only a small advance in the price of tin was needed to make it a dividend paying concern. The report of the agent, Capt. John Nicholas, which appeared last week, was considered encouraging.

'For remainder of Meetings see to-day's Journal.'

## FOREIGN MINES.

CAPE COPPER.—At a meeting of the directors, on Wednesday, it was resolved that a dividend of 20*s.* per share, free of income tax, be declared, payable on the 29th inst.

LINARES.—At a meeting of the directors, held on Thursday, it was resolved that a dividend of 3*s.* 4*d.* per share, free of income tax, be declared, payable on Oct. 3.

ALAMILLOS.—At a meeting of the directors, held on Thursday, it was resolved that a dividend of 2*s.* per share, free of income tax, be declared, payable on Oct. 3.

FORTUNA.—At a meeting of the directors, held on Thursday, it was resolved that a dividend of 2*s.* 8*d.* per share, free of income tax, be declared, payable on Oct. 3.

ST. JOHN DEL REY MINING COMPANY (Limited).—Advices received Aug. 31, 1874, per Tiber, dated Morro Velho, July 29, 1874:—

MINES AND MINING WORKS: Since the 17th current the general operations of the mine department have been carried on regularly and steadily.

SURFACE WORKS: I have the pleasure of communicating the completion of the Quebra Panela pumping-wheel on the 25th current. A still piece in that mine fell on that day, and as yet the repairs of the injuries caused thereby have not been completed.

ADDITION STAMPS: With pleasure I hereby advise the addition of 12 heads, being the remainder of the powers of this mill, to the number already in operation reducing mineral, this augmentation having commenced on the 18th current. The completion of the permanent arrangements for the supply of this stamps with mineral will be shortly put in hand.

WATER SUPPLY: The decrease in the quantity of water coming on the establishment limits in no small degree the operations of the mine and reduction departments, and this drawback is daily becoming more perceptible.

Morro Velho, Aug. 1: MEASUREMENTS OF EXCAVATION: The undermentioned measurements were taken this morning:—

	Horizontal length of excavation under roof	Horizontal length of excavation over slopes	Vertical lowering of eastern ground for formation of sink	Height of this point above floor of B cross-cut	Width of lode in the eastern end under roof
	52 ft. 6 in.	51 ft. 2 in.	63	12	11
Being from centre of shaft A eastward	42 ft. 6 in.	42 ft. 6 in.	4	7	3
And " " " westward	50 ft. 6 in.	51 ft. 2 in.	11	11	11
From shaft A eastward	52 ft. 6 in.	51 ft. 2 in.	12	12	12
From shaft A westward	50 ft. 6 in.	51 ft. 2 in.	11	11	11
Ground	52 ft. 6 in.	51 ft. 2 in.	11	11	11

By comparison with the measurements taken at the end of June it will be seen that the driving eastward has advanced 11 ft. 10 in., whilst that in the opposite direction has only progressed 3 ft. 10 in., the great difference being consequent upon the fall of the western part of the stall on 18th ult., which caused a cessation at the end, and an acceleration at the other end of the point of operations.

The increase of the length of the excavations at the height of the slopes is due to the progress made in an eastern direction in the lowering of that ground, or, as it has been sometimes called, sinking.

The vertical height of the eastern ground in the line of the inclined shaft—above the floor of the B cross-cut, is 4 ft. 7 in. The width of the lode is taken at this point. The width of the lode at the western end under the roof could not be obtained, as the opening made is only a part of its width.

Advices received Sept. 15 per Douro, dated Morro Velho, Aug. 17:—

MINING OPERATIONS: These have proceeded regularly, and with few interruptions since the date of last advices.

OUTPUT.—The average number of wagon loads of mineral delivered on the spalling floors per diem during July was 168-5. In consequence of the temporary exhaustion of quarrying facilities, due to the stoping operations having overrun in some degree the extension of the excavation, the mean of the deliveries on the spalling floors during the first 16 days of August has only reached 157-8 per diem. This state will only be of temporary duration, probably for the remainder of the month; and, in fact, it could be even at once remedied, were it not that we are unwilling to incur the risk of anticipating the supply of the coming month.

SINKING.—This work is being rapidly pushed on, and fair progress is being made. The inclined sinking-lift was brought into use on the 11th current, performs its duty satisfactorily.

DRIVINGS.—The extension of these continue to be favourable at both points of operation.

BORING.—The perforation of a second bore-hole to unwater the Cachoeira and Bahu excavations was commenced on the 3d inst., and on the 14th a small stream of water was tapped at a distance of 11 ft. 6 in. from the mouth of the hole. The boring of this hole has since been suspended, owing to our force being otherwise employed.

ATTENDANCE.—The attendance of Brazilian borers was very small in the beginning of the month, and on the 15th their absence being partially supplied by draughts from the mechanics department.

GOLD PRODUCE FOR THE MONTH OF JULY.—The gold extracted during the month of July is as follows:—

	Ozts.	Tons.	Ozts.	Tons.
From General mineral at stamps	23,915-9	from 3475 = 6-853		
Ditto in re-treatment	1,970-3	" " = 567		
Total	25,886-2	3475 = 7-420		
Ozts.	Ozts. Troy	Tons.	Ozts.	Ozts. Troy
25,886-2	= 2972-7298	from 3475 = 7-420	= 8554	

Notwithstanding that the working days of July only exceed those of June by one, the duty performed during the former is much in excess of that of the latter, consequent on a greater number of stamp-heads being in operation. Though the yield of ore per ton during last month is less than that of its predecessor, yet, from the larger tonnage under treatment, the produce above given exceeds that of June by 8027 ozts., or 348-9637 ozs. Troy.

COST AND PROFIT.

Produce ..... 25,886-2 ozts.

Loss in melting ..... 138-7 " "

Cost, less sums received in reduction of the same ..... 25,647-5, at 7*s.* 9*d.* per oz. .... £2093 8 1

Cost, less sums received in reduction of the same ..... 4433 16 8

Profit ..... £5504 11 5

The cost is heavier than that for June, especially for labour in the borers pay, while in the same comparison the outlay for stores, especially timber, has similarly increased.

PRODUCE TO DATE.—The gold extracted during the first division of August—a period of eight days—proves to be as follows:—

	Ozts.	Tons.	Ozts.	Tons.
From mineral at stamps	6559-0	from 831 = 6-689		
" " " in re-treatment	519-3	" " = 624		
Total	7078-3	831 = 7-313		

Comparing this by days with the return of the last division of July, we find that while the duty on the former has very considerably decreased from a short water supply, the produce has not fallen in the same ratio owing to the standard of the mineral having somewhat improved, but that the daily produce is less by 103 ozts., or 11-8741 ozs. Troy, than that of the previous month.

The following telegrams have been received on August 20:—Produce for month of July, 25,886 ozts. from 3480 tons; yield 7-4 ozts. per ton; produce per diem, 831 ozts. On Aug. 21, produce eight days of August, 6072 ozts.; yield, 7-3 ozts. per ton; produce per diem, 758 ozts.

On Aug. 24, profit for the month of July, 5500*l.*; duty of stamps lessened from short supply of water.

On Sept. 1, produce 11 days of August (second division), 8305 ozts.; yield 6-7 ozts. per ton; produce per diem, 755 ozts.

Remittance received, 48,185 ozts.—5555 ozs. Troy.

DON PEDRO.—Epitome for July.—General Remarks: Ores continue to be taken from Canoa and Nos. 6 and 8 shoots, and the boxwork principally from No. 8, below the 25.—Sinking: We have again encountered great difficulty in this, in consequence of meeting with more soft soils; sunk 8 ft. 6 in. The shaft to date is now 115 fms. on the dip below the 30 fms. cross-cut. After sinking another 10 fms. we are reaching the next cross-cut. Ores raised 2441 tons; boxwork, 1-06 tons. Produce, 6605 ozts., at 8*s.* 3*d.* per oz., 2807*l.* 2*s.* 6*d.*; cost, 2661*l.* 7*s.* 6*d.*; profit, 145*l.* 15*s.*—Explorations: The adit level has been driven 8 feet at reduced size, the ground is hard for breaking; it is proposed to drive this more easterly, to explore immediately over the existing auriferous lodes, by putting up rises from the slopes to the level and from the level to surface. At Matto de Tambor pits are being sunk under the superintendence of two English miners prospecting the surface, but up to now nothing discovered.—First Division for August: Produce weighed up 2800 ozts. Ores continue to be taken from Canoa and Nos. 6 and 8 shoots. The sampling is very fair. Sinking has again been hindered, but we have fixed the 10-in. lift of pumps by the side of the 5-in., which will, we anticipate, enable us to do better duty. Dawson's wheel is pumping 18-94 cubic feet per minute.

ROSSA GRANDE.—Epitome of Monthly Documents for July: Cost, 535*l.* 9*s.* 7*d.*; produce, 587 ozts. of gold; loss, 293*l.* 6*s.* 10*d.*. Ore treated, 286 tons; average produce, 2-05 ozts. per ton. Average daily force, 80-1. Mine report: Bahu Force small, for want of funds. Stopes laid open, producing low-quality mineral. The shoot in bottom of the 10 west is not yet intersected in the stopes in bottom of this level. The third formation produced 114*l.* 5*s.* 3*d.* worth of gold, for an outlay of 102*l.* 5*s.* 6*d.*. The ore has been obtained in sinking only. The same men employed in stoping would quarry double the quantity.—First Division of August: Extracted from letter, dated Aug. 16: Mine—Bahu: The present force employed on the establishment amounts to 36 daily. I am, consequently, able to do but very little in the Bahu Mine, and I have no change to report in the lode on the present occasion.—Third Formation: As we increase in depth this lode is becoming more pyritic. I have otherwise no alteration to communicate since my last.

CHONTALES.—The directors have advices (August 5) from Mr. Smedley, who reports:—I regret to inform you that on account of the continuous rains, and a succession of heavy floods, we have been unable to keep the battery supplied with quartz. Up to the 20th we had managed to carry on with a few stoppages, but on the following days we had a still heavier downpour, and on the morning of the 24th we had not access to a single mine. San Sebastian, Santo Domingo, and San Benito had closed, and a landslide upwards of 100 yards in length had occurred on the Estrella Tramway, as well as sundry other minor damages. A new cutting was completed on the 31st, and we are again able to obtain quartz from this mine. San Benito repairs will be completed in about three days. San Sebastian in about a week. Santo Domingo will require longer, and it will probably be the end of the present month before we can obtain quartz from it. The quantity of ore reduced has been 1173 tons, and the quantity of gold obtained 187 ozts., being an average of 3-15th dwts. per ton. The cost for the month has



been 6371, gold obtained valued at \$254, leaving a loss on the month of 121.—San Sebastian: There is no change to report in this mine, the air drive to the south level is being completed, and I shall now drive on the course of this level from No. 3 level; in No. 1 it continues poor, but I think it will improve. The quantity of quartz obtained has been 432 tons, and the average yield about 2 dwts. per ton. —San Benito East: The level in this mine is at present upwards of 8 ft. wide. A rise to surface, 90 ft. in height, has been completed, and as soon as the damage is repaired (in a few days) we shall be in a position to obtain more quartz from this mine than we have hitherto done; the prospects here are good, as we know that there is a rich shoot further eastward under the old workings. The quantity of quartz obtained has been 232 tons, and the yield about 4 dwts. per ton. —Estrella: The level in this mine is at present upwards of 8 ft. wide; the old level referred to in previous letters still continues, being immediately over the back of the present level, but I think we are nearly at the end of it, and as soon as we reach that point I shall put up a rise to surface. A small portion of a few days ago yielded at the rate of 1 oz. per ton, or rather more. The quantity of quartz reduced has been 255 tons, and the yield about 4 dwts. per ton. —Santo Domingo: We shall be obliged to put in a new cross-cut to re-open this mine, which I expect to do at a small cost. There is no change in the level; the quantity of quartz reduced has been 224 tons, and the yield about 3 dwts. per ton. Capt. Tonkin has just informed me that they have got through the run in San Benito.

**MINERAL HILLS.**—Extract from a letter received by the official liquidator from Mr. Oakes, under date Aug. 24:—"The mines continue to maintain themselves, and have turned out this week 80 tons of ore, of an average grade of 800 per ton, at a mines' cost, including stores, materials, and sorting waste dumps, of \$1054.75. The explorations in the Taylor Tunnel and Giant are being pushed forward with all possible speed; the ground is very hard, but the men are doing good work. Two additional men have been put on this week to prospect about the Banner Mine, from which we took out some good ore last year, but abandoned it when we struck the limestone, having no funds to carry the work further. I hope we may be successful in finding some mineral in and about this mine."

**COLORADO TERRIBLE LODGE.**—Aug. 27: The agent reports the mine is looking well. The railway receipt note for the 4th shipment reached the office on the 14th, and the 4th was to leave Georgetown on Sept. 2. The agent advises that he is sending a shipment weekly, and hopes to improve upon this. The 4th shipment has arrived in Liverpool, per City of Richmond. Each shipment is roughly valued at 6000, net, and consists of 10 tons of concentrated mineral.

**CEDAR CREEK GOLD MINES AND WATER.**—Telegram from the superintendent, Col. T. B. Ludlum:—"We have cleaned up after a run of 32 days on Cinnamon claim. The gross returns are \$9500; the profit is \$3750."

**CHICAGO.**—Telegram from the manager, Mr. W. S. Goabe:—"Net profits for month of August, after deducting mining and furnace expenses, are \$9000. Have remitted you draft for \$3600, sterling."

**RICHMOND CONSOLIDATED.**—Cablegram from the mine:—"That the furnaces had been stopped for the past week in consequence of the engine having been temporarily disabled, that it is now repaired, that two furnaces had been started, and that the third would be started on Wednesday."

**BLUE TENT.**—Telegram from the superintendent:—"We have cleaned up after a run of 18 days on the Enterprise claim. The gross returns are \$9250; the running expenses are \$5750."

**INDEPENDENCE GOLD QUARTZ.**—A telegram announcing the result of August clean-up was received on Sept. 14, from which it appears that 875 tons of quartz were crushed during the month, which produced \$6750, the total expenses being \$4000; thus showing a profit of \$2750, or 5001.

**JAVAIL.**—The manager (Aug. 5) reports that during the month the mill had worked 23 days, crushing 1353 tons of quartz, yielding 498 ozs. 19 dwts., at an average of 7½ dwts. per ton. The value is \$3856. 16s. 2d.; expenditure, 5121. 3s. 5d.; profit for the month, \$735. 12s. 7d. Machinery in good working order. Labour plentiful.

**SIERRA BUTTES.**—The result of the working at the Sierra Buttes and Plumas Eureka Mines for August was received on Monday:—Sierra Buttes: Receipts, \$45,814; cost of mining and milling, \$22,316.—Plumas Eureka: Receipts, \$21,298; cost of mining and milling, \$12,568.

**TOLIMA.**—Sept. 14: Frías: June returns, \$11,636.14. June expenses, \$9250.3; less improvements, \$1162.5—\$8087.6. Equal to 5911. 8s. 4½d. The manager reports 25 tons, 0 ft. 3 in. ground expended, of which 19 tons, 5 ft. 6 in. were unproductive, leaving 5 tons, 4 ft. 10 in. productive ground, which produced 212½ per fathom of the whole lot. The following is from the underground agent's report:—Engine Shaft: Good progress has again been made in sinking the shaft, being now 10 ft. 2 in. below the 20 ft. level; the total ground sunk during the month 1 ft. 5 in. 2 ft. in. The level throughout has been large, and very productive; the mineral, however, has been of an inferior quality, the major portion being too poor for export. We regard this as a good indication, as it has been invariably found in this mine that a strong lode producing poor mineral is always the precursor of a large deposit of rich mineral.

The 20 ft. level north-east continues to open out well, the lode in the present end averaging 15 in. to 18 in. wide, and producing fully 1½ ton of rich export ore per fathom. The rise in the roof of this level is not so rich as when last reported upon. The 20 ft. level south-west Yankee's end has improved, the lode being now full 2 ft. wide, strongly impregnated with galena, blende, pyrites, &c.; in fact, producing first-class stamps ore. The winze in bottom of the level also looks well, the lode is 2½ to 3 feet wide, composed of quartz, blende, pyrites, and galena, with a layer of light blue killas on the footwall. The quartz shows spots of grey and is thickly coated with native silver; a most promising lode, but letting out much water, which makes it very troublesome for sinking.

The 20 fathom level, on 45° Weldon's Lode East. This end is, on the whole, not looking so well, the lode having been disordered by a cross joint or branch that came in from the south side. The lode, however, seems to be regaining itself as we wear away from its influence. The rise in the roof of this level produces a little mineral. The bottom stop has been very rich throughout the month, the lode averaging 8 in. to 10 in. wide, nearly solid mineral, and very rich for silver. The 20 west also produces good mineral. This end is only occasionally worked, as we have not hands enough to keep it continually going.—No. 2 Winze, S.W. End: This end has much improved, the lode being now over 2 ft. wide, composed of quartz, pyrites, and blende, the whole producing good stamps mineral. Blende, on 45° Weldon's Lode, is still unproductive.—Surface End: Level: The ground in this end seems to be changing its level and dip. The lode has also commenced to give a little mineral, chiefly galena; we, therefore, look forward to a change for the better here shortly.

**Columbian Rise:** The lode here is still of a promising character, and produces quantities of rich mineral; the ground is also easier for progress. In consequence of a scarcity of miners we have been obliged to suspend the two last-named stations, but shall continue the prosecution so soon as we have hands to put in them. All the other stations are much the same in appearance as when last reported on. Our surface workings are progressing steadily, good progress being made in the new engine wheel pit. Alluvial Deposits: The last run gave 432 ozs. Troy of gold-dust, but the work has been stopped temporarily for water.

**BATTLE MOUNTAIN.**—Aug. 20: The 188, being driven north, carries a small vein of rich ore—say, from 40 to 60 per cent. copper; the lode is firm, carrying a good hanging and a hard footwall. The 188 ft. stopes are producing good ore, and yielding fairly. Cook's winze, in bottom of the 188, is down 12 ft., and presents a fine appearance; it is opening up a piece of ore ground which I have great hopes in. The lode is large, and the ore of superior quality, being red oxide principally. A rise has been commenced in back of the 188, about 200 ft. north of the new shaft, and shows a good lode, carrying considerable carbonate and sulphurates of copper. The 70 ft. stopes, in Lake Superior, are turning out some good ore still. I think the prospects of the Virgin Mine are as fine or finer than I have ever seen them before. We have one of the most points in the lower levels, and considering the strong and firm walls, and rich ore which is being met with, although not so large as we could wish, yet at this depth—say, 340 ft. below the surface, considering the rise of the hill—it is evident that we have a mine which, in no great length of time, will pay its owners handsomely. We have raised during the week 280 sacks; 45 tons, assaying 27 per cent., has been sold at San Francisco, at \$13.75 per unit.

**EXCHERQUE (Gold and Silver).**—L. Chalmers, Aug. 24: I am now pumping the water from the winze, and although I have my additional hoisting machinery on the ground I have not a man to spare to put it up. My two last battery samples sent yesterday, I reserve further remarks until I can send you ore and bullion returns next Monday.

**ICA.**—Aug. 1: The survey of the new ditch is being proceeded with, and as soon as finished a full report on the cost of this work, and all other particulars, will be forwarded.

**MALPASO.**—July 31: It was anticipated that the new ditch from the Medina would be ready in the month of August, and that work would then be commenced on the main banks. The superintendent writes:—"The mine is now through all dead work, and only needs water to drive ahead in good gravel."

**MALABAR.**—Washing was recommenced on July 29. The superintendent (Aug. 10) writes:—"The Mine: Up to date we have no change to notice in the character of the deposit, and it will be observed that we are still, strictly speaking, engaged merely in opening out the ground. Had all the stuff we got through in our first run been gravel we should have had several thousand dollars instead of \$1000, as we must have sluiced off in 110 hours at least 50,000 or 60,000 yards of ground, of which less than one-fifth was auriferous.—Returns: Although our gravel banks are limited in extent we fully anticipate we shall obtain good returns, more than sufficient to cover the cost of our working, and a few runs ought to determine what our prospects are likely to be for the future. At the present date, although our work has been so much interrupted, we have a good prospect of amalgam in the sluice, and shall probably clean up about the middle of next month, after getting in a good run. As a clean up occupies about three days we consider it far preferable to run for a good number of days before suspending washing in order to clean the sluice and undercurrent. The mine, even supposing we get nothing better than we have now before us, must pay profit. Our first trial of 110 hours' run, under all kinds of difficulties, and losing a considerable portion of the produce through waste of slime and undercurrent, proves this, and both Mr. Anderson and myself entertain a very sanguine opinion as to our future runs. As in all new enterprises, with new ditch and matrix machinery, some small delays and disappointments are inevitable. My object all through has been to carry out energetically Mr. Anderson's views, as he is a thoroughly experienced and competent hydraulic miner, and understands perfectly what he is about; indeed, I can safely assure the board that they would find it impossible to get a better man, as he has the rare quality of standing exposure to the climate without getting ill, and in a mine like ours almost daily exposure to sun and wet is inevitable."

**NORTH AMERICA.**—D. W. C. Morgan, Aug. 27: Water for washing purposes failed us on Aug. 19. We shall not be able to do more in that line until the winter storms set in again. I shall keep in the present force of hands, and get ahead main tunnel and subdrift on the north and south sides. About 4000 loads of drift gravel from same localities worked during the last few weeks, which has paid remarkably well, can be put into the yard monthly until (say) the middle of November. By that time, or possibly earlier, we shall have enough of the new ground drained to open three or more breasts of the length of 80 ft. each, upon which to work, and should expect to extract gravel paying richly. The only difficulty in the way of a splendid result another season would seem to be the draining of the ground, and that difficulty will not exist if the drifts and openings can be pushed ahead from now on with all the hands that can be advantageously employed in the mine. All the most advanced points opening, so far as I have been able to test the gravel, have given very satisfactory results. The gravel, which will be put into the yard until the month of November, or until broasting can be commenced on the high rock, will, when washed, pay all (say more)

the expenses incurred in doing all work on the mine in the meantime. After November, or when operations can be concentrated entirely in new ground, feel confident of a good earning, not only for the next season, but for a long time to come. We have not yet put up a third rise in the main tunnel, believing it best to advance further ahead, so that when the uprise is made the water therefrom will not interfere so much with the operations in the face of the tunnel.

**CAPE COPPER.**—The Cape Parliament has voted 5000, for the improvement of Port Nolloth Harbour. The Coronella, to load about 435 tons of ore, chartered in 1 week. Returns for July, 1874: Ookiep, 755 tons of 30 per cent.; Spectakel, 57 tons of 31 per cent. The railway traffic for the four weeks ending July 25 was 316 tons up and 625 tons down. Bills of lading received for 200 tons of ore per Asiatic, 325 tons per Gilpin, and 600 tons per Tacoma.—Arrival at Swanes: The Marion, with 400 tons of ore.—Sales by Public Ticketing: 528 tons of ore on Sept. 1, at an average of 15s. 5½d. per unit, realising approximately 14,300. Put forward for sale, by public ticketing, 400 tons of ore, on 22d inst.

**BENSBERG.**—C. Craze, Sept. 12: Victoria Shaft: We have lowered the small pump here to about 8 ft. from the bottom of the shaft, and we have also had to lower the cistern for the large one, but in doing so have had a great deal of trouble to get it to lift good water again, and up to the present it is not working well; thinking it may be owing to the India rubber valves, I have to-day sent to Cologne for some new ones, and if the fault is here it will be made right this evening. The shaft will be in good working order by to-morrow, so as to be able to commence sinking the shaft and driving the level west.—New Shaft: In the level west of this shaft we have come upon a body of pyrites, which for the present has destroyed the value of the lode for lead. We are still driving the end; and, seeing that we have an ore lode several fathoms west of this at Victoria shaft, we may hope for an improvement. There is no particular change at any other point.

**MENZENBERG.**—R. K. Roskilly, Sept. 16: Since my last report satisfactory progress has been made in the sinking of Dickins' engine-shaft, which is sunk 43 fms. 5 ft. 6 in. below surface. The ground here is presenting a very promising appearance, and, judging from its nature at this point, also the progress made during the past fortnight, having sunk fully 1 inch, or 1 fm. 0 ft. 10½ in., that by the middle of next month we shall have the shaft sunk deep enough to commence to cut plat, and drive cross-cut south, in order to intersect this lode. The branches or feeders in this shaft, reported on last week, are still looking favourable, being composed of spar, with spots of yellow copper ore. The engine and pitwork are in good condition, and working well.

**LUSTANIAN.**—Sept. 8: Palhal: The lode has not been taken down during the last fortnight in Taylor's engine-shaft below the 170. In No. 96 winze, sinking below the 70, east of River shaft, on Basto's lode, the lode is in two branches, composed of flookan and country. In No. 97 winze, below the 38, on mill lode, the lode is 4 in. wide, unproductive.—Levels on Basto's Lode: In the 170, west of Taylor's, the lode is 5 ft. wide, composed of quartz and ore, worth ½ ton per fm. The lode is 4 ft. wide in the 150, east, composed of quartz and ore, worth ½ ton per fm. In the 140, west of side of Taylor's, the lode is small and poor. In the 120, east of River shaft, the lode is 4 ft. wide, composed of small quartz and country. The lode in the 110, east of this shaft, is 2 ft. wide, of no value. In the 90 east the lode is 6 in. wide, yielding small stones of ore. The lode is 8 in. wide in the 70 east, producing ½ ton per fathom. In the 28 east the lode is 4½ ft. wide, composed of quartz and ore, worth ½ ton per fathom. In the 130, north-east of Taylor's, on the slide lode, the lode is 1 ft. wide, of dry flookan. The ground in the adit cross-cut has somewhat improved for driving through. At Carvalhal, in the cross-cut south of incline shaft, at the 60, we have gone through another branch of spar, about 1½ in. wide, from which water is issuing.

**LINARES.**—Sept. 9: Pozo Ancho: The 85, west of Crosby's shaft, continues in a small and poor lode. In the same level, on the south lode, the lode has a promising appearance, and yields 1 ton of lead ore per fathom. The 75, west of Crosby's, is in a large strong lode, containing a few spots of ore. The same level, west of San Francisco shaft, is opening up a good length of stoping ground, and yields 1½ ton per fathom. The 75, east of San Francisco shaft, is in a very regular lode, yielding ½ ton per fathom. The ground in the 65, east of this shaft, is hard. In the 65, west of the same shaft, the lode yields 1 ton per fathom. The 55, west of the same shaft, yields also 1 ton per fathom. The same level east is in a small and poor lode. Warner's engine-shaft will be down the required depth for the 100 fm. level by the end of the month. No. 180 winze below the 45, yielding 1 ton per fathom, and the kindly lode. The ground in the 120, east of below the 75, is wet and troublesome for sinking, worth for lead 1 ton per fathom. The usual quantity of ore was raised in the past month, and the stopes at San Francisco are looking moderately well at present. The surface work is going on with its usual regularity, and the machinery in good working order. We estimate the raisings for September at 125 tons.—Los Quinientos Mine: The lode in the 80, west of Taylor's engine-shaft, continues large and strong, consisting of quartz and ¼ ton of lead ore per fathom. The 65, in the same direction, has nothing of value at present. The lode in the 45, west of Taylor's, has fallen off in value, yielding at present ½ ton per fathom. The 80, east, of Taylor's, is producing little better appearance, and is letting out water freely. The lode in the 65, east of this shaft, is small and poor. The 55, east, of Addis's, is unproductive. The same level west of San Carlos is opening up better ground, worth 1½ ton per fm. The 65, west of this shaft, is in a regular, well-defined lode, producing good stones of lead ore. The same level east has a strong, open lode, yielding ¾ ton per fm. The lode in the 55, east of Judd's shaft, has improved, now worth 1 ton per fm. In the 45, east of this shaft, the lode continues small, producing ½ ton per fm., and the ground hard. There is no change to notice in the 32, east of same shaft; the lode is worth ½ ton per fathom. San Carlos shaft, below the 85, is being put down as far as possible. Good progress is being made by Addis's shaft, below the 55, Cox's shaft, below the 55, is being sunk by a full pair of men. We hope to hole Acien's winze below the 45 by the end of this month. The lode in Pablo's winze, below the 55, is large and strong, and yields 2½ tons per fathom. The lode has improved in Diego's winze, below the 55, to 3 tons per fathom.

**FORTUNA.**—Sept. 8: Canada Incoas: The ground in the 110 cross-cut, north of Judd's shaft, is hard. No change to report in the 80 cross-cut south of Henty's shaft. The 50, west of San Pedro, is in a lode containing spar, clay, and lead ore, but not sufficient to value. The lode in the 60, west of San Pedro, is very small and poor. The 60, east of this shaft, is in a large lode, yielding 1½ ton of lead ore per fathom. The lode in the 50, east of San Pedro, is worth ¾ ton per fathom, and is larger than 1 ton per fathom. In the 40, east of this shaft, the lode improved to 1 ton per fm. The lode in the 80, west of Kennedy's shaft, is small, and has no lead to value. The 90, west of Lowndes's shaft, has very much improved, and worth at present 2 tons per fathom. The lode in the 90, east of this shaft, is worth 1 ton per fathom. The 80, east of Segura's, also yields 1 ton per fathom. There is no change in Judd's shaft below the 100 since last report.—Los Salidos: The 116, west of San Carlos's shaft, is in a regular lode, with a little lead ore. The ground in the 90, west of San Carlos's shaft, remains hard, and lode poor. The 120, east of Morris's engine-shaft, is in a large lode, and worth 1 ton per fm. The 110, east of this shaft, is yielding 1 ton per fathom. The 100, east of this shaft, produces ½ ton per fathom. The lode in the 45, west of Palgrave's, is worth 2 tons per fathom. The 45, east of this shaft, is in a fine lode, yielding 1½ ton per fathom. There is no change in the 25, east of Footway shaft. The lode in the 35, west of Swaffield's shaft, has improved to 2 tons per fathom. In the 25, west of this shaft, there are two branches, but not enough lead to value. The ground in Buenos Amigos engine-shaft below the 110 remains hard for sinking. The lode in Palgrave's engine-shaft below the 45 produces 3 tons per fathom, and continues to look well. In Swaffield's shaft, below the 45, the lode is large, and yields 1½ ton per fathom. The lode in the 100, west of the 100, yields 3 tons per fathom. In Orive's winze below the 35, the lode has improved to 3 tons per fathom. Merino's winze below the 100, west of San Carlos shaft, is in advance of the 110; lode small. Ricardo's winze, east of Palgrave's, is in advance of the 45; lode small, we expect it will improve soon. The rate of raising ore was well maintained during the month; the surface work is going on very regularly, and the machinery is in a good working condition. We estimate the returns for September at 350 tons.

**ALAMILLOS.**—Sept. 9: The lode in the 30, west of San Francisco shaft, is small, and spotted with lead. In the 50, west of this shaft, the lode has fluctuated in value, now worth 1 ton per fathom. The 50 cross-cut, north of La Magdalena end, is in a large, strong, and open lode, and worth 1 ton per fm. The 85, west of Rafael's winze, is being driven to meet the last-named end. The lode in the 85, west of Taylor's engine-shaft, has a promising appearance, and worth ½ ton per fathom. In the 50, east of San Victor's, the lode continues unproductive. The lode in the 50, east of San Carlos shaft, is small add poor. The lode in the 50, east of Judd's engine-shaft, is not so rich as it was, and contains 1½ ton per fathom, with more carbonate of lime and soft clay. The 60, east of this shaft, is in a hard unproductive bar of ground. There is no improvement to report in the 40, east of this shaft. The 50, west of Crosby's shaft, yields good stones of lead. In the 20, west of Swaffield's, the lode is small and poor. In the 30, east of this shaft, the lode is poor at present. The 30, west of the same shaft, has a little lead. The sinking of San Victor's engine-shaft, below the 75, is going on very regularly. The sinking of San Victor's engine-shaft, below the 50, will be commenced immediately the plat has been enlarged and a roadway cut; the penthouse is now being put in. In Judd's engine-shaft, below the 50, better progress is being made, but the ground is exceedingly hard. The ground has underlain to the shaft at Morris's, below the 40; it is of promising appearance, and worth 1½ ton per fathom. The 40, east of this shaft, has been left out, and the driving is discontinued. In the rise from Cave level the lode is small, and going off very flat west; ground hard, and unimproving. In the level north on main lode, behind No. 1 stopes, Cave level from No. 2, a little lead holds forth, but ground generally poor. In the 20, north from No. 1 stopes, a small branch of lead continues in the end, yielding ½ ton lead per fathom, and the ground promises an improvement. No. 1 stopes in back of the 20 north produces 1 ton lead and ¼ ton calamine per fathom; the ore is a continuation of the short rising north from No. 1 Cave level; at present the lode is very large, and split up in branches, but looks likely to yield some time longer yet. The raisings of ore for present month is estimated at 35 tons lead and 35 tons calamine.

[For remainder of Foreign Mines, see to-day's Journal.]

**TREATING AURIFEROUS ANTIMONY ORES.**—An improved method of extracting gold from auriferous antimony ores, antimonial compounds, and antimonial mixtures has been invented by Messrs. BRIGHT and NEWBERRY, of Mel-

bourne. Metallic antimony is fused with ores, compounds, or mixtures, and the gold thereby alloyed with the metallic antimony. The alloy falls to the bottom of the material under treatment, from whence it can easily be removed. When the alloy becomes sufficiently rich in gold—it may be by repeated use—such gold is removed by oxidising the antimony in any of the ways at present known or suitable for the purpose.

## IRON AND STEEL INSTITUTE.—Concluded.

BY T. R. CRAMPTON, LONDON.

This paper detailed the results of the writer's experiments up to the present time, and its object is to show that certain improvements for rendering the puddling process more economical have been effected in the utilisation of slack or small coal without the production of smoke; the automatic feeding of fuel and air in proper proportions, by which only perfect combustion can be effected; the production of heat of the highest intensities with perfect regularity both as regards intensity and quality; the construction of puddling-furnaces without brickwork, composed of a single chamber, in which the gas is produced, consumed, and the material treated; the reduction of wear and tear both of the lining and the furnace, by the prevention of unequal contraction and expansion; also that the setting of the revolving furnace can be effected in a quick, simple, and effective manner, and, lastly, that phosphorus and sulphur may be eliminated from common pig to such an extent as to enable good steel to be produced from it.

Samples were exhibited showing not only iron manipulated in various ways, from wire drawn in 18 gauge, and then tin-plated to plates and rails, but also steel and crucible steel produced from the same material. He placed with his steel specimens other steel of good quality made from Swedish iron, that the members might have the opportunity of comparing them. For general convenience he arranged the specimens in such order that a glance was sufficient to see the differences of texture in the material from its state in the puddled bloom to finished rail and tool steel.

He would call attention to a practical advantage in the working of his furnace compared with ordinary fixed furnaces, as well as with revolving furnaces having separate combustion chambers. In the fixed furnaces two difficulties have to be contended with—the incorporation with the iron of particles of coal thrown over from the combustion chamber or fire-grate into the puddling chamber, the quantity of which is much increased when blast is used, which particles being too large to be burnt immediately become lapped on the iron. In a similar manner pieces of brick falling from the roof of the furnace are lapped up. Revolving furnaces are only subject to the coal falling into the iron, but that is bad enough. No subsequent hammering or rolling will entirely free the iron from these impurities, which are sources of great injury and loss in the case of plates or sheets, although they may not be so injurious when the iron is rolled into large sections, such as rails or bars. In his furnace neither of these difficulties arise, there being no bricks in the furnace, and the coal is so small that it is immediately consumed on coming in contact with the iron by the proper equivalent of air, which is always injected with the fuel, even if directed on to the iron itself. Of course, if coal is injected in masses, as in the case of the fixed furnace, the fuel must be formed as closely as possible up; but this is assuming an extreme case, which would be immediately lapped up by the reduced temperature in the furnace. He did not wish to convey the impression that it is impossible by the ordinary system to produce iron free from these impurities; but while such products can only be obtained by excessive care and attention, his system almost precludes the possibility of the impurities entering the iron. In fact, nothing but extreme carelessness could produce such a result.

During experiments with fixed puddling-furnaces the fuel and air was in some cases injected directly into the furnace, but there were certain difficulties, amongst which may be noticed the destruction of the first bricks. After having made various experiments with the two-chambered revolving-furnace, using a brick combustion chamber, which, as he anticipated from its revolving action, reduced the wear and tear on the bricks, it was then determined to try the effect of direct combustion in contact with the work, it having occurred to him that the oxide lining would not be injuriously affected thereby. The results were most satisfactory, and it was discovered that not only did it not have any injurious effect, but that a more intense heat was attained with considerably less fuel, besides eliminating all brickwork from the construction of the furnace. The fuel consumed was only 10 cwt. per ton of iron, whereas in the case of the fixed furnace it was never less than 17 cwt. to 20 cwt. per ton of puddled bar, including melting the cold pig, whereas when it was injected into the single chamber less than 10 cwt. sufficed under the same circumstances with large heats.

It was mentioned at a former meeting that the furnace may be heated and cooled as rapidly as desired without in any way affecting the stability of the lining or the true running of the furnace itself. This is due to the water casing preventing excessive or unequal expansion or contraction. The effect which the water casing has upon the furnace may be thus exemplified:—On one occasion (after the furnace had been some time at work) a hole of 4 in. in diameter was to be cut out of the two end plates, a rest containing a tool was placed in front of the furnace, and a groove cut through them both, as true as it could be done in any ordinary lathe, the furnace revolving on its own bed and carrying wheels, and rotated by its own engine. It is his impression that unless puddling machines are made absolutely true in the first instance, and are able to retain that truth through their practical working, the wear and tear and inconvenience—to say nothing of the cost of constant repairs from the buckling and distortion of the plates, and the shaking of the entire fabric, and the extra power required—will be so great as to render it doubtful of their becoming a commercial success.

With regard to the squeezer and the hammer, he remarked that the squeezer, so far as its operation is known at present, does not express the cinder so effectively as the hammer; the squeezer bar being full of dirt, whereas that from the hammer is perfectly clean. If it be desired to sell cinder from iron the squeezer effects the object, but if good clean iron be required the hammer is the more effective implement. There are certain conveniences in regard to the squeezer, if it could be made effective, but as it will be obvious that if a power be exerted and applied by the squeezer sufficient to penetrate to the centre of the ball, the mass of it would be crushed and spread over the rollers, thereby preventing the rotation of the puddle ball. Squeezer balls, which he had seen broken cold, of about 10 to 12 inches in diameter, only showed metallic fracture to about an inch from the exterior surface, all round the whole of the interior showing no appearance of iron. To a certain extent by re-heating and re-working these blooms much of the cinder may be expelled. But it is his conviction that in order to obtain the best results in cleaning iron from under the hammer must be as hot as possible, and the cinder all expressed as the first heat under the hammer avoiding to turn the ball up, which by doing tends to close the channels from which the cinder is running. When the cinder comes to flow, the bars should be turned round, and the rollers, as far as possible, it is difficult to carry this out always, but the principle should be kept in view. Many have thought it was impossible to manipulate 10 cwt. to 12 cwt. balls under the hammer, but at Woolwich a different opinion was entertained, and the puddle balls which have been made have been successfully treated without any great trouble or any special appliance being adopted. He has no doubt, when it becomes necessary to do so, that balls of 1 ton weight may be heated under the hammer with the aid of special appliances. The mechanical detailed arrangements for supplying water to the casing, as well as the mode of conveying and injecting the fuel, air, and the means of attaining high and regular temperatures, were fully described in a previous paper, and no further improvements have been made on these points, as they are perfect in their operation. But a wearing ring of simple construction may be noticed. It consists of a square bar of iron or steel, or other metal formed into a ring, and inserted between two angle irons, which form part of the furnace, and is riveted or bolted up between them: the same is applied to the flue. The inner surface of the ring is exposed to the water in the casing, the outer wearing surfaces project about ¼ in. These rings are replaced when required. It may be observed that as these rings are always cold and quite true on their faces, but pressure is required to keep them together, and they are replaced by a liquid cinder passes them. With regard to the effect of reduced in puddling in a revolving furnace with pulverised coal in eliminating the foreign matters from the iron, he called attention to the products as exemplified by the samples. Phosphorus and sulphur have been the great difficulties that iron and steel makers have had to contend with, and the number of means proposed, and the immense sums of money that have been expended in the endeavour to eliminate these elements are almost incalculable. Mr. Snellus, during the discussion of Mr. Spencer's paper, previously referred to, pointed out that phosphorus had been eliminated to a great extent by revolving furnaces, but that it was with a little too high. But this, he said, rather indicated that they might succeed in coming down to the right limit by and-by. The members would, he thought, doubtless arrive at the conclusion that this limit has now been obtained, and that Mr. Snellus was right in his conjecture. He could not account for these results altogether. As far as he knows there is no essential difference of working in either of the three furnaces referred to, except that he can and does maintain regular and very intense temperature by means of powdered fuel and nicely arranged feeding apparatus.

The President stated that Mr. Kirk, who was present, but not well enough to address the meeting, had written a letter, the effect of which was that he could not guarantee the figures quoted in Mr. Crampton's paper, with reference to the iron made under his superintendence, as he had not seen the materials weighed. Mr. Crampton said it was quite right for Mr. Kirk to guard himself; the weights had been furnished by the official weighers.—The President explained that there was no question of truth before the meeting: it was simply an act of caution lest Mr. Kirk should at any time be held to have verified the figures. Mr. PRICE bore testimony to the present successful working of the machine. Mr. SPENCER did not think the high temperature was so important as was supposed by Mr. Crampton.—Mr. HEAD was sanguine as to the ultimate success of the patent.—Mr. THOMAS believed the iron produced was of excellent quality, and that it would have to be worked in the way that Mr. Danks or Mr. Crampton was working it, and that the members expressed their appreciation and cordial thanks for the arrangements made by the Institution for the meeting. Thanks were also given to the Duke of Devonshire and Lord Frederick Cavendish, M.P., who had accompanied the members in their visits to the works, and to Mr. Charles Smith, the local secretary.—This concluded the business of the meeting.

In the afternoon a special train took a portion of the members to Millom Ironworks and the Hodbarrow Iron Ore Mines, where luncheon was provided by the Cumberland Iron Mining and Smelting Company and the Hodbarrow Mining Company. Another party proceeded to the Asken Ironworks, where they visited the Park Mines, the Roanhead Mines, &c., and they were afterwards entertained at luncheon at the Furness Abbey Hotel by the Furness Ironworks and Millom Company. On Friday there was an excursion to the Cumberland Iron Mining and Smelting Company, and the members expressed their appreciation and cordial thanks for the arrangements made by the Institution for the meeting. Thanks were also given to the Duke of Devonshire and Lord Frederick Cavendish, M.P., who had accompanied the members in their visits to the works, and to Mr. Charles Smith, the local secretary.—This concluded the business of the meeting.



## FOREIGN MINING AND METALLURGY.

There has been comparatively little business passing in copper at Paris. Quotations have not varied, and remain as follows:—Chilian, in bars, 81. 10s.; ditto, ordinary descriptions, 79. 10s.; ditto, in ingots, 87. 10s.; English, tough cake, 84. 10s.; and pure Corocoro minerals, 80. 10s. There has not been much business passing in copper at Havre; Lota and Urmeneta have made 81. 10s. to 81. 4s. per ton. Upon the Marseilles market only a few small transactions to meet the requirements of consumption have been noted. The aspect of the German copper markets is considered to have improved, although the transactions indicated thus far have not presented any very great importance; prices have been generally firm. The Dutch tin markets have continued firm. In consequence of the small quantity of Banca disposable, holders have maintained an attitude of reserve, and have only sold small quantities at a time. For Banca 57½ fls. to 58 fls. have been paid; at the last dates there were no sellers below 58½ fls. The Dutch Society of Commerce has announced a sale for the 29th inst.; this sale will comprise 22,300 ingots of Banca. Transactions in Billiton have been insignificant; some hundreds of ingots have found purchasers at 55 fls. There has been some little improvement in tin quotations at Paris; Banca, delivered at Havre or Paris, has brought 102½; Straits, ditto, 97½; and English, delivered at Havre or Rouen, 98½ per ton. The Berlin tin market has been firm. The Paris lead market has remained without variation; at Marseilles, also, lead has ruled quiet. Prices have been sustained upon the German lead markets. There has been some improvement in the price of zinc at Paris; Silesian, delivered at Havre, has made 23½ fls.; ditto, other good marks, delivered at Havre, 22. 16s. per ton.

The manufacturers of plates and fine iron in Belgium state that they are well off for orders at sufficiently remunerative rates. On the other hand, the proprietors of the Belgian mechanical construction establishments complain that they have scarcely anything to do. The forgemasters, and especially those applying themselves to the manufacture of rails, contend eagerly and sharply for a few small orders; nevertheless, one hears it said on all sides that the state of affairs has much improved since the commencement of the summer, and this seems to be the case thus far—that the rolling-mills producing merchant iron are working pretty well. The market for pig has also been somewhat better sustained. In presence of the small margin existing between the price of iron and steel, the Belgian Minister of Public Works will probably be disposed to replace iron rails by steel rails to some extent. As regards current prices, and the current features of the Belgian iron trade, there is little of interest to note this week. We learn that the Seraing Works have received a large order for rails—10,000 tons—for Belgian State lines.

The tidings which come to hand from the various metallurgical groups of France are unanimous in representing the situation as good. Heavy orders begin to arrive, and this is regarded as auguring well for the season which is about to open. Coke-made iron is firmly maintained at 9. 12s. per ton. Even at this quotation an early advance is anticipated. An advance of 4s. to 8s. per ton has taken place in construction plates; there has also been an advance in axles, which have risen from 12. 8s. to 12. 16s. per ton. The foundries are tolerably well off for work at present, and the tone of quotations seems likely to improve. In the Franche-Comté district fine pig is worth 7. 8s. per ton. The quotation for iron in the Nord is 9. 4s. to 9. 12s. per ton for current affairs. In the Meurthe-et-Moselle group the competition of the products of Alsace and Lorraine is beginning to be experienced.

The coal trade of France still remains in a languishing state. No revival has yet taken place in affairs; all that can be noted of a favourable character is the receipt of considerable orders for coal for domestic purposes. Prices are well maintained; there are even rumours of a contemplated advance in quotations, but no one has yet dared seriously to attempt it. The time does not appear to have yet arrived for it. In the Nord and Pas-de-Calais the extraction has been somewhat reduced, and stocks have been declining. Colliery proprietors assign the want of labour as a cause of their inability to increase the production; if this were really the case they might push on preparatory and exploratory works a little less eagerly. Whatever may be the cause, firmness in prices is becoming more decided, and the tendency appears to be in the direction of an advance with the first appearance of winter. In the basin of the Loire the state of affairs is far from brilliant; the extraction has been reduced, and yet stocks have not been brought within a narrower compass, as very little has been sold. Metallurgical industry also appears to have profited less in the basin of the Loire from the improvement which has generally appeared elsewhere. Upon the whole, the French coal trade may be said to be rather living on hopes than realities. The Loire Mines Company will pay on Oct. 16 an interim dividend for 1874 at the rate of 6s. 6d. per share.

The Belgian Coal Trade has remained very quiet. Although deliveries by water have been rather active there has been comparatively little business doing; and if prices are maintained it is because the production has been much reduced, and there are no stocks. The advance which has been decided on in the Couchant de Mons as from Sept. 1 has experienced the fate which everyone expected for it; the new quotation remains almost nominal for all qualities except for the very best, for which 1s. 6d. to 2s. 6d. per ton more is generally paid. The system of nominal quotations and secret reductions which seems to prevail in Belgium is much to be regretted; such expedients have generally done more harm than good. Contracts are about to be let for the supply of the coal required for the prisons of Belgium until June 30, 1875; the aggregate quantity represented by these contracts is by no means inconsiderable.

## THE SALT WORKS OF VOLTERRA.

The royal salt works of Volterra, in the province of Pisa, are the most important in Italy, and are situated on the River Cecina, about seven miles from the town of Volterra, near the terminus of the branch line from the railway from Leghorn to Rome, called the station of "Le Saline." These works have been leased by the Government to a contractor for 25 years.

The salt occurs in beds in the ash-grey miocene or middle tertiary clays, and several pits, averaging from 20 to 30 metres in depth, have been sunk in a place called "Le Moie Nuove" about a mile distant from the works. The pits being supplied with water filtering naturally through the soil, the brine constantly rises in strength according as the rainfall is more or less, and from other changes of the atmosphere. The brine is pumped up by horse-power and conducted in a wooden canal to the works. As some of the pits yield a weaker brine than others, they are employed in dry seasons for reducing the strength of that of the pits which contain more salt to 20° or 21° Baumé, which experience has proved to be generally the most convenient strength for evaporating.

The works are provided with five complete sets of evaporating apparatus, placed in suitable buildings; the pans for evaporating the brine are made of boiler plate, and are 28 ft. 9 in. long by 21 ft. wide, and 1 ft. deep; to each pan are attached two others of similar dimensions for concentrating the brine. Each of the evaporating pans is provided with three fireplaces, and the waste heat is turned to account for the concentrating fires.

The brine is conducted from the pits to large wooden tanks placed at a higher level than the evaporating apparatus, and from thence it can be drawn as required, passing first to the upper concentrating pan, which is heated to 30° C. (86° F.), and finally to the evaporating pan, where the temperature is raised to 70° C. (158° F.), and the salt that has been deposited is scraped out and allowed to dry for a short time, and then put into sacks. About 2 tons of salt are produced every six hours, and the daily production of the establishment ranges from 40 to 45 tons. The fuel used is chiefly brushwood, and it is found that to produce 1 ton of salt 1 ton of wood is consumed. These works also produce refined salt and *sale pastorizio*, or salt for agricultural purposes.

The refining of the common salt from the evaporating pans is a very simple operation, consisting in merely heating it until it is reduced to a fine powder, and it is afterwards pressed by hand into moulds into blocks weighing one kilogramme each, the salt for agricultural purposes (*sale pastorizio*) which is sold at a comparatively low rate, together with the refuse scrapings of the evaporating pans, which are ground in a mill, together with gentian root, red earth, and vegetable charcoal, and this mixture, to which a little water, is added is pressed by hand into moulds of cylindrical form, about 6 in. in diameter and 7½ in. in height. These cylinders are afterwards dried.

The retail price of the refined salt is 76 frs. per 100 kilos.; that of the common salt 64 frs., whilst the salt for agricultural purposes is sold as low as 12 frs.

The whole operations are conducted on the piece-work system, the men earning from 2 to 3 frs. and the women and girls from 1 to 1-50 frs. per day.

Arrangements are also being made for the manufacture of soda from the brine on a large scale, by an improved process, invented by Signor R. Campani, the chemist to the works. This manufacture will shortly be in full operation, and will, without doubt, form an important addition to the establishment, and tend to increase its prosperity.—*Journal of Society of Arts.*

THE "ESPERANZA" AND "PUERTO" GOLD MINES IN GUERRERO. —These mines lie about 10 leagues south-west from the town of Coyuca, in the State of Guerrero. The Esperanza Company was organised over three years ago, during the active period in mining operations when many other companies were organised about the same time, most of which have gone the way of things that were. There are good mining properties in this country, almost without number, but it is difficult to secure the combination in their management requisite to ensure success—intelligence, energy, and honesty, either of which wanting, failure is the result. Reference might be made to the Real del Monte Company, which through pure mismanagement of the late superintendent the shareholders have had to pay over \$1,000,000 in calls to get the company out of its difficulties. The mines are now we learn in a condition to give handsome dividends very shortly. Had this property been intelligently managed dividends would have continued instead of calls being made. We might mention other facts sustaining our views, but we must confine ourselves more to the special subject we had in view—the Esperanza and Puerto enterprises. Our readers will remember that Mr. Petherick, late superintendent at these mines, has been in England several months for the purpose of securing capital there for the proper development of these properties upon the scale which they deserve; and by the last French packet the president of the joint companies received a provisional contract for the organisation of a consolidated company in London, with a capital of 150,000. This contract has been ratified here by the shareholders in both companies, and it is expected that the final arrangements will be completed at an early day. We look upon the results of this enterprise, not only as to the direct interest of the stockholders, but the mining interest at large, the vital interest of this country. Mr. Thomas Horncastle, director of the Bank of London, Mexico, and South America, in this city, has been named by the parties in London as their agent, and Major R. B. Gorsuch, president of the two companies, has the management of the properties placed in his hands. Major Gorsuch we understand has also been elected president of a new board of directors, elected by and represents joint interests of the Aviados and Aviadores in the Esperanza. The success of this enterprise is in a great measure the result of the ability and honesty with which Major Gorsuch has managed the business in the midst of many trials and vicissitudes. The energy and constancy of this gentleman were remarkable and fortunately advantageous to the company, while others pertaining to it were dragging it towards disrepute by various nefarious speculations—men who were noisy but incapable, who were industrious but their objective point was their own selfish interests. Fortunately Major Gorsuch has saved the enterprise, and

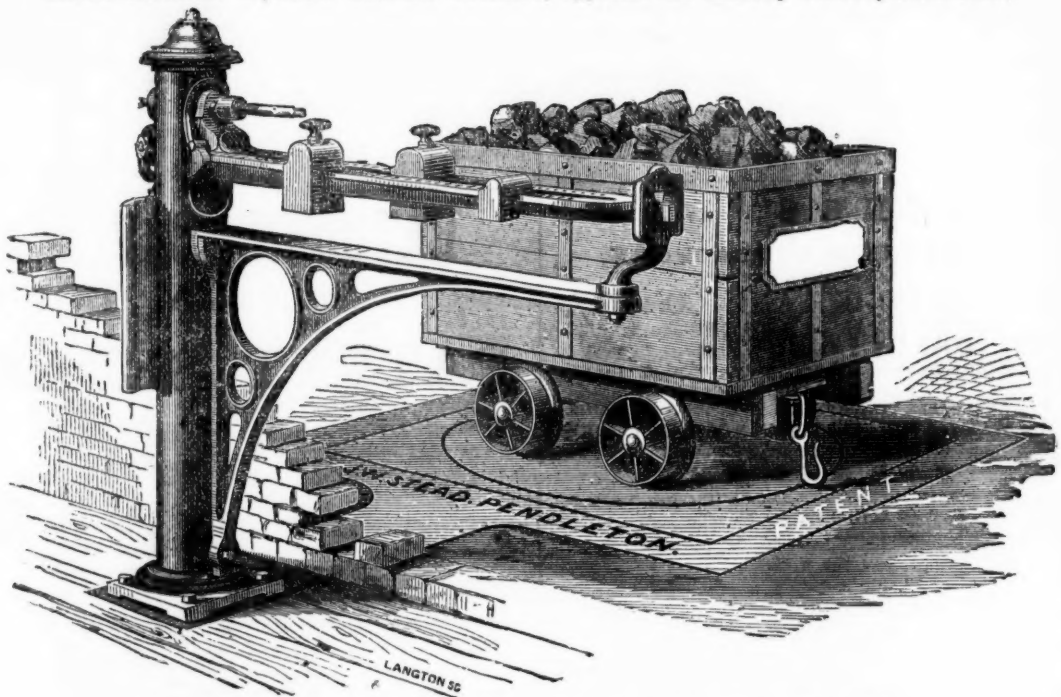
we hope, as we expect, that it will soon bring to the shareholders handsome dividends. The ores of these mines are rich and abundant, and there is no reason, now that sufficient capital has been procured, under its present efficient management, and with the aid of the intelligent superintendence of Mr. Henry Bishop, superintendent of the Esperanza, and Walter Grose of the Puerto, that a rich return will soon reward the investors. At a meeting of the shareholders of the Esperanza and Puerto Mining Companies, held on Monday, July 27, the following officers were elected:—Esperanza: President, Major Robert B. Gorsuch; directors, Col. David Ferguson, Messrs. Robert Geddes, James Sullivan, and Jose D. Ansuategui.—Puerto: President, Major R. B. Gorsuch; directors, Col. D. Ferguson and Sr. D. Sebastian Camacho.—*The Two Republics (Mexico).*

TIN-PLATE MANUFACTURE.—The invention of Mr. C. E. D. MORRIS of Britonferry, Glamorgan, relates to tin-pots, and consists in forming or fixing in the interior thereof wings, ribs, projections, rails, or perforated plates, so as to block up a portion of the space ordinarily available for the plates to be tinned, and thus preventing the workman from inserting into the pot more than a certain number of plates at a time.

MANUFACTURE OF IRON.—To obtain the object of this invention Mr. R. STONE proposes to construct a cupola furnace of the usual form, but having at intervals from the bottom loose grids or sieves of terra cotta, fire-clay, or other suitable non-combustible material placed between the layers of fuel and the pig iron, so that upon melting, the molten metal will fall through to the bottom of the cupola, and the foreign matter be sifted, or sustained by the terra cotta grids, or sieves. In some instances he employs a vertical shaft in the cupola made of suitable non-combustible material, and fitted with arms or provisions, so arranged that when the shaft is rotated they will agitate the molten metal, and by this means free the metal from all foreign matters. This shaft and the agitators may be suspended above the cupola and inserted thereto when the metal is in a molten state, and able by being agitated to give off its impurities.

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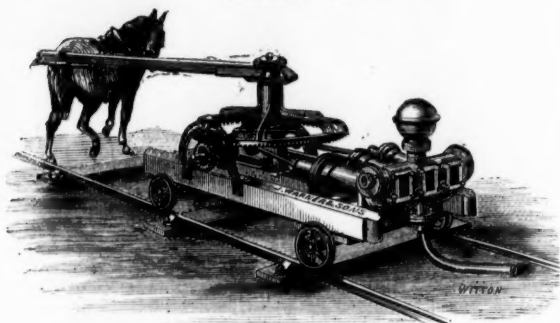
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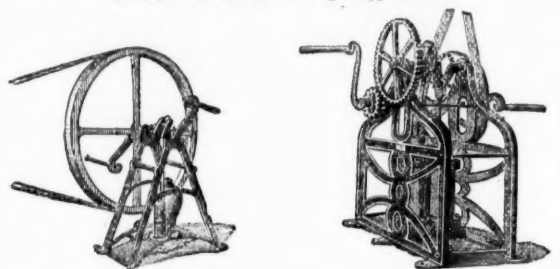


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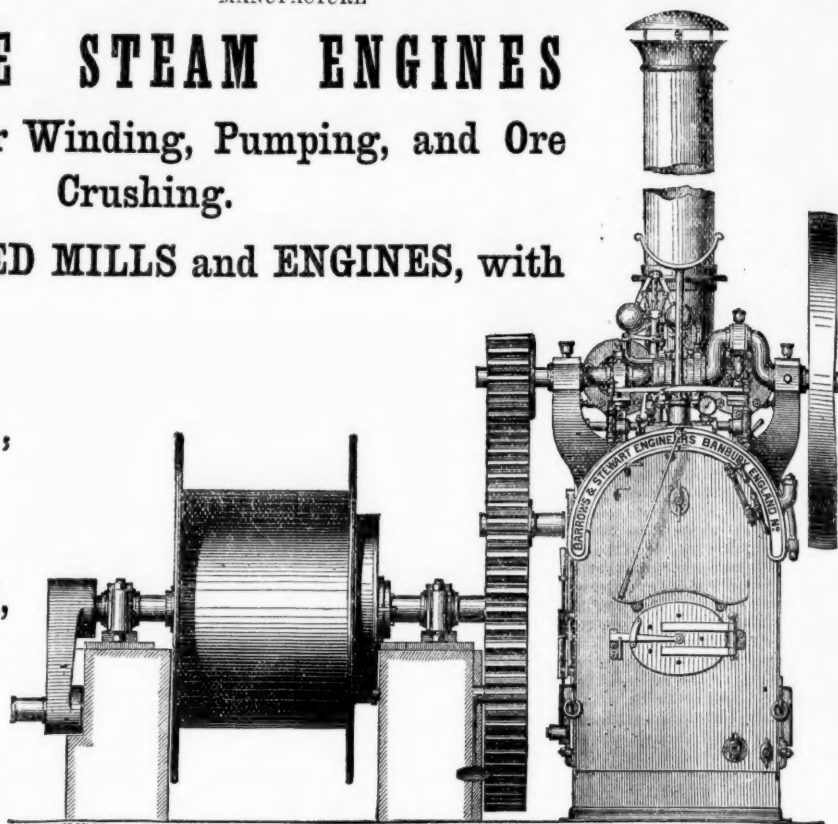
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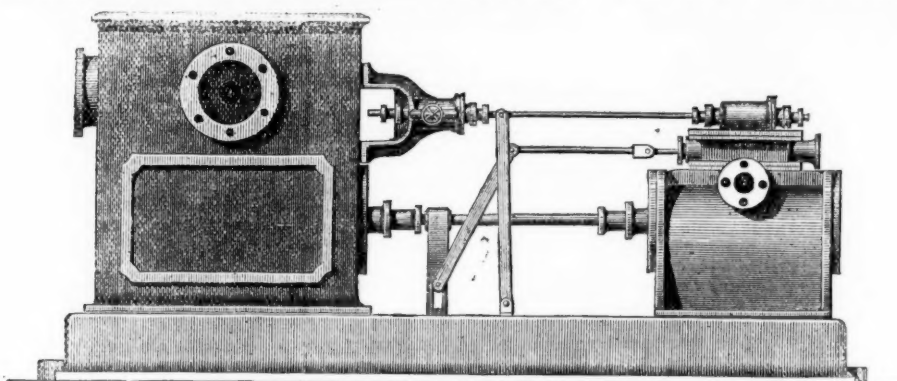
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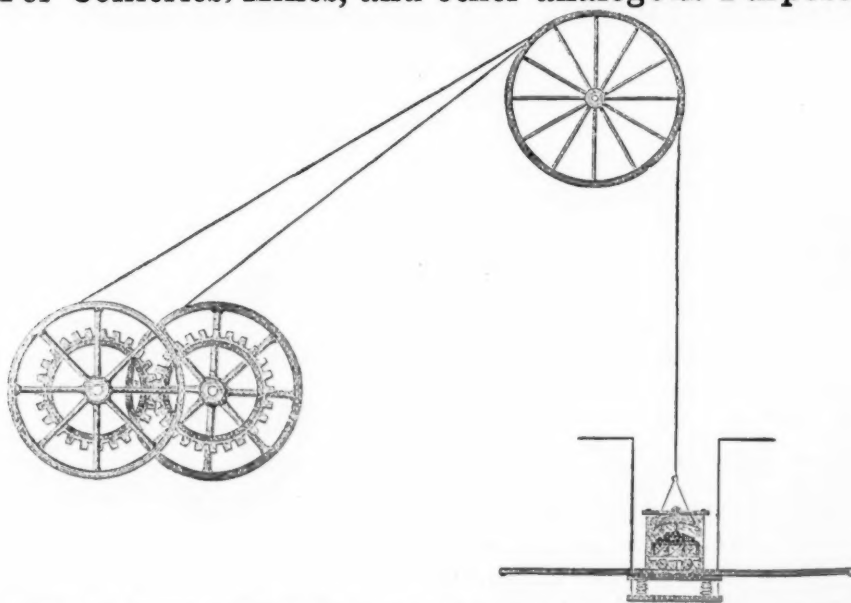


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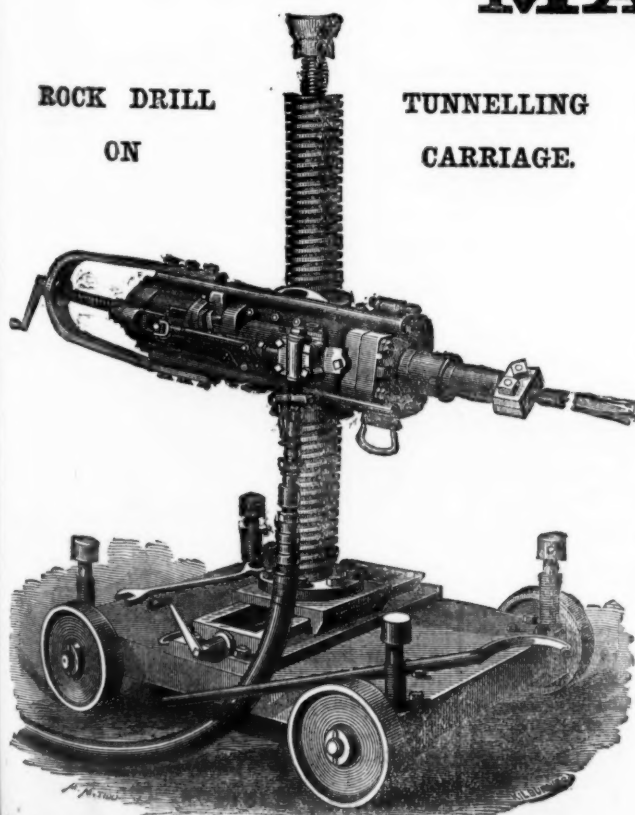
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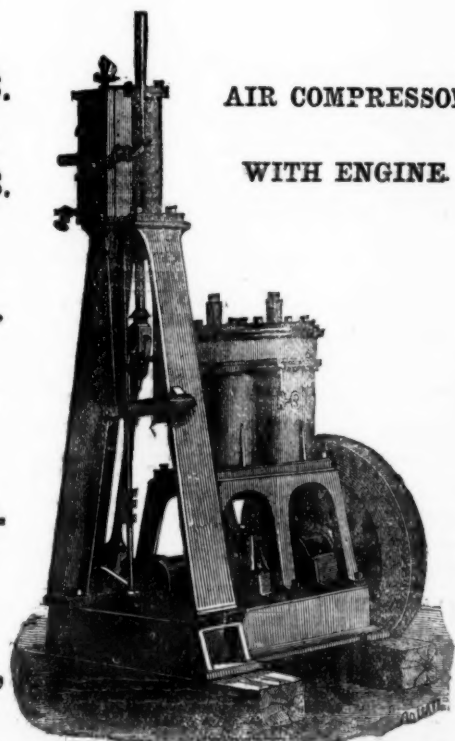
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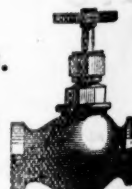
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PRICES AND PARTICULARS ON APPLICATION.



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